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APRIL 3, 1937



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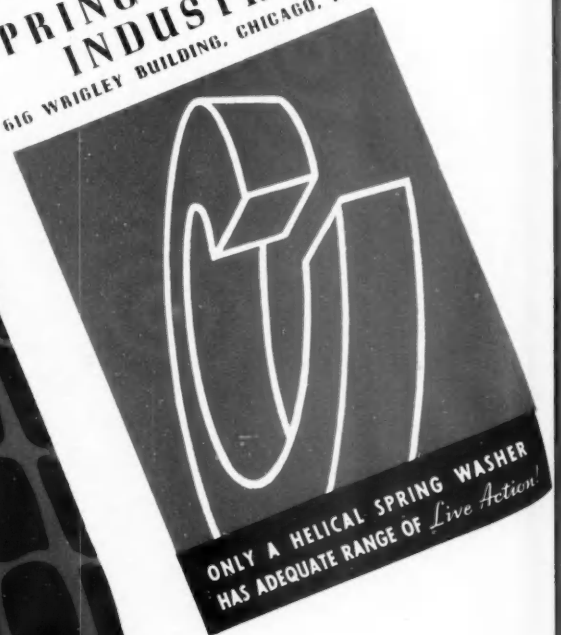
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AUTOMOTIVE INDUSTRIES

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Automotive Industries

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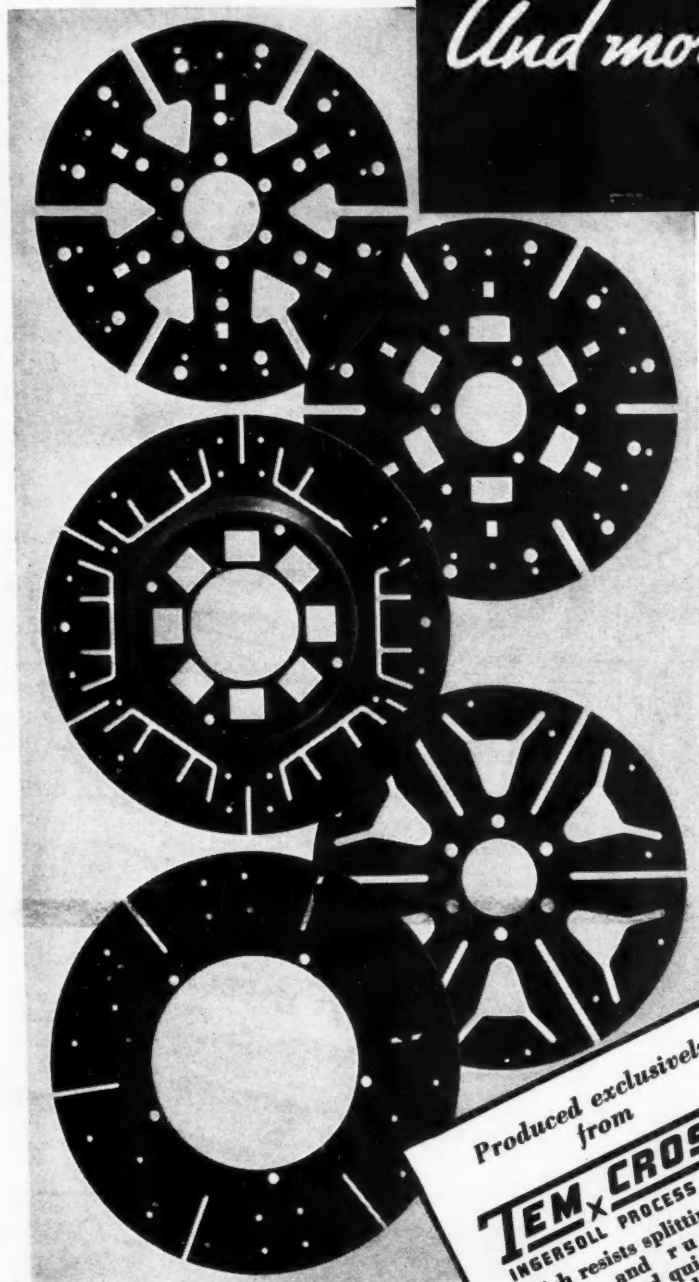
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April 3, 1937

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Superbly **SMOOTH**
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Ingersoll Clutch Plates are especially designed and produced exclusively from a superior steel rolled in our own mills to meet every requirement of speed and service

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CLUTCH PLATES

April 3, 1937

Automotive Industries

AUTOMOTIVE INDUSTRIES

Founded 1895

Vol. 76, No. 14

April 3, 1937

This Week

If you will turn to page 520 you will find another of those interesting production stories that appear each month. This one is about the unusual features of the Spicer plant and is well illustrated with photographs taken right on the scene of action.

The mechanical drawings appearing on pages 537 and 538 show two views of the Bugatti straight eight engine.

Harry S. Churchill puts the tourist trailer in its place. If you will read the article "What Is the Trailer's Place?" on page 515 you will get his answer.

Daily Output Off 7000 Units

*With One-Fourth of Industry Tied Up by Strikes,
April Will Fall Short of 600,000 Scheduled*

By Harold E. Gronseth

At least 500,000 cars and trucks were built by the automobile industry in March on the basis of preliminary production figures of leading manufacturers. Final reports probably will show that the half-million mark was topped by a comfortable margin. This is an increase of 15 per cent over the 433,992 units built in March last year and is about the same gain as shown by the entire first quarter over the corresponding period of 1936.

The March output represents a sharp increase over that of February when according to Department of Com-

merce figures the industry in the U. S. and Canada built 383,637 cars and trucks. Last month's gain over this figure was more than 30 per cent. A closer estimate can now be made of the first quarter's output which appears to have reached at least 1,285,000 units as compared with 1,117,172 in the initial quarter of 1936.

The industry goes into the second quarter of 1937 with about 25 per cent of its productive capacity still tied up by strikes. Although authorities were hopeful of an early settlement of the Chrysler strike and expected that the peace plan evolved would serve as a basis for ending the impasse at Hudson and Reo, several days already have been lost from the current month, and each day of idleness in these plants means about a 7000-unit loss to April's anticipated output. With all plants in operation, the current month was slated for a 600,000-unit production, but this goal is unattainable in view of the present tie-up.

Meanwhile, the bulging spring demand is lifting the sales curve into new high ground for the recovery period. Last month's truck deliveries are expected to set a new all time high of around 75,000 units while passenger car deliveries should total upward of 385,000. The second ten-day period of March showed a substantial gain over the first ten days. The sales of eight leading companies were up 22 per cent. Dealers of strike-halted companies were well enough supplied with cars so that the effect of plant closings has not yet registered in retail deliveries.

Many of the companies have their factory sales forces on the road busily engaged in consolidating field organizations in preparation for what is expected to be the greatest retail activity since 1929. In view of the big volume of new car sales anticipated for the second quarter, close attention is being paid to the used car situation. One company devoted nearly its entire March newspaper campaign to advertising used cars, requiring its

Murphy Hopes for Early Settlement

*Chrysler Steadfast in Refusal to Yield on UAW Priority;
New Sitdowns Plague Detroit Industry*

Chrysler conferences with the United Automobile Workers Union in Lansing were adjourned on Wednesday and were to resume again Friday when John L. Lewis was expected back from New York. W. P. Chrysler also promised Governor Murphy to return to the conference either Friday or Saturday.

Governor Murphy was confident that a settlement would be reached not long after the parties reconvened. "We will sit day and night," he said, "if necessary, until we get it. I am anxious to return the 65,000 employes to work."

Despite the fact that the conferees have not gotten anywhere on fundamentals, a good deal of ground has been gained in the week's conferences. The corporation refused to yield a single step to give the UAW priority or a preferential contract. It is believed that negotiations will be speeded up when Lewis and Chrysler return. The two men have been getting along famously at the conferences, amazing their colleagues by their amiability. Their attitudes have given the Governor hope for an early settlement.

The union was reported to have modified its demands slightly so as to give

Chrysler employes freedom of choice in representation but with UAW consent before bargaining negotiations could be entered into with other groups, as well as UAW approval of any agreement that might be reached.

With an important conference between coal operators and his United Mine Workers union on his hands in New York, John L. Lewis was forced to quit the Chrysler parley Sunday. Before he left, Lewis appointed Homer Martin, UAW president, Richard T. Frankenstein, organizational director, and Lee Pressman, CIO attorney, to represent him at future conferences. On the corporation's side are W. P. Chrysler, chairman; K. T. Keller, president, and Nicholas Kelley, attorney.

The procedure has been for the representatives of the two sides to meet in separate rooms at the state capitol, exchanging written communications through the governor or conciliator James F. Dewey and being brought together only when agreement seemed near. On Monday, however, the conferees were in joint session for three hours.

(Turn to page 518, please)

dealers at the same time to run heavier classified advertising.

Studebaker Corp. reports the sale of 6166 passenger cars and trucks in the first 20 days of March compared with 5287 in the corresponding period of March, 1936—an increase of 17 per cent. For the year to date the sales are 21,870 compared with 17,519 last year—an increase of 25 per cent.

Lincoln-Zephyr production by Lincoln Motor Co. for the current season has reached a total of 15,500, equaling in less than six months total production of the 1936 series cars, it was announced. Reports from dealers throughout the country show that Lincoln-Zephyr retail deliveries for March would set a new monthly record since the introduction of the car in October, 1935.

Oldsmobile sold 8365 cars at retail during the second 10-day period of March, as compared with 6595 units during a similar period in 1936. This gain of almost 27 per cent brought total sales for the first 20 days of March to 14,638, as compared with 12,627 during the same period last year. Despite the curtailment of production for approximately four weeks, due to a shortage of materials, total retail sales by Oldsmobile dealers from Jan. 1 to March 20 were 32,990 units.

Retail deliveries of Nash cars during March were greater than for any month since 1929, and two and one-

half times as great as those of March a year ago. March production of Nash cars was double that of March, 1936.



Acme Photo

The three leading figures in the Chrysler-UAW conference pose for the cameramen: (left to right) John L. Lewis, head of the CIO; Gov. Frank Murphy of Michigan; and Walter P. Chrysler, chairman of the board, Chrysler Corp.

General Motors Net \$238,482,425

Equal to \$5.35 on Common Stock; Unit Sales Reached All-Time Record Last Year; Value 24.5% Over 1935

General Motors Corp. reported net income for 1936 of \$238,482,425 equal after preferred dividend provisions to \$5.35 a share on the common stock. This compared with \$167,226,510 or \$3.69 a share for the preceding year. Sales were \$1,439,289,940, a gain of 24.5 per cent over 1935 while unit sales of 2,037,690 cars and trucks set a new all time record for the company, exceeding the 1929 mark of 1,899,267 units by 4.3 per cent. The report stated that sales of other products including Frigidaire showed important gains with most departments setting new records as to unit sales.

The corporation did 41.6 per cent of the domestic automobile and truck sales, and 37 per cent of world's sales.

Dividends of \$5 on the preferred and \$4.50 on the common set new records although earnings for the year were exceeded in 1928 and in 1929.

The report commented on wage increases of five cents an hour last November and again in February of this year, raising the hourly rate 15 per cent above 1929. Average annual earnings of hourly paid employees were seven per cent higher in 1936 than in 1929, and since cost of living was 17 per cent lower, purchasing power rose 29 per cent over 1929. Average an-

nual wage of hourly paid workers was \$1541 and in addition they received appreciation fund awards averaging \$46 each.

The report stated that notwithstanding the handicaps imposed in various parts of the world on international trade the corporation, through its foreign subsidiaries, has improved its position in world automobile markets. Of net foreign sales of \$282,968,935 production originating in the United States and Canada was \$165,412,235 and production originating overseas was valued at \$117,556,700. Opel German sales in 1936 were 120,397 units against 102,765 in 1935. Of the total 104,692 were for use in Germany and the rest exported. Percentage of Opel to total registrations was 41.3 against 42.2 in 1935. Of the total 36,068 were for domestic use and rest exported. Unit sales were about nine per cent of British auto sales.

The corporation is enlarging its electromotive plant. No statement of its operations was made. The balance sheet showed cash of \$188,559,022 against \$185,450,398 in 1935. U. S. government security holdings were \$4,998,666 against \$11,741,527; sight drafts, \$9,859,406 against \$10,008,548; accounts receivable, less reserve, \$69,-

899,698 against \$56,600,243; inventories, \$225,644,812 against \$196,325,118. Current assets totaled \$513,986,448 against \$465,028,108. Current liabilities total \$174,299,897 against \$145,066,889. Reserve total \$351,079,451 against \$312,855,950. Net properties were \$690,190,825 against \$592,150,300.

A letter entitled "The Story of the General Motors Strike" was sent April 2 to stockholders by Alfred P. Sloan, Jr., president of the corporation. The purpose of the letter, which resumed concisely the history of the strike, the motive behind it, and the agreement finally reached with the union, was to give stockholders a better understanding of the steps taken, and the present status of the United Automobile Workers union as a bargaining agency for those of its members who are GM employees.

Akron Strikers Worry

Can't Understand Firestone Management "Sitdown"

In the Firestone-CIO month-old deadlock at Akron, Ohio, where 10,000 employees have been idle since March 3, the shoe apparently is on the other foot. John Lewis' United Rubber Workers Union, which originated the sitdown technique in Akron more than a year ago, is now doing the striking and plant picketing, but the "sitdown" appears to be on the part of Firestone top officials in the balmy sunshine of Florida.

Registered letters sent by the URW to Mr. Firestone and Mr. Thomas in Florida, brought a brief note from the latter, March 29, with the comment that

the company was willing to negotiate on wages, hours and working conditions but cannot "recognize as subject to negotiations" the URW demands for sole bargaining rights and abolition of the Firestone Employees Conference Plan. Mr. Thomas advised that W. R. Murphy, labor superintendent, is authorized to negotiate with the union on all "negotiable" matters.

The Firestone strategy seems to be quite new. It appears to have URW leaders stumped. Union leaders have taken to the radio to appeal to Akron citizens to bring the issue to a head and force the company to negotiate. A giant mass meeting of representatives of 80 Akron unions is planned for April 4. Futile appeals have been made to Gov. Martin L. Davey to intercede. Meanwhile Mr. Firestone and Mr. Thomas continue to sit in Florida.

UAW President Proposes Michigan "Wagner Act"

Homer Martin, president of the United Automobile Workers Union, advocates a "Wagner Act" for Michigan. In a statement following a conference with members of the House Labor Committee in Lansing, Martin declared that neither of the recent major strikes in Michigan would have occurred had employers observed the provisions of the National Labor Relations Act.

"The proponents of the anti-sitdown bills which have been introduced into the senate," said Martin, "evidently are anxious to add another weapon to the already complete arsenal of the industrialists."

One-Sixth of Income Spent on Cars

*U. S. Public's 1936 Bill Totaled Ten Billion Dollars,
Over a Quarter of Which Went for New Vehicles*

Overwhelming importance of the automotive industry in the national economy was demonstrated again in the year 1936 when the American public paid over a sixth of the national income for its motor vehicles and the materials and services to keep them in operation.

The American motorists' bill in 1936 totalled \$10,020,000,000 excluding amounts paid for vehicle and operating licenses, but including the enormous sums paid in taxes on gasoline, parts and motor vehicles themselves.

Over \$2,630,000,000 was spent for the purchase of more than 3,500,000 pas-

How far will unionism go in the automobile industry? Is Detroit about to be strongarmed into a closed shop city? These are questions frequently heard during the conflict between employers and organized labor which has made Detroit its principal battleground for many months.

The apparent strength of the United Automobile Workers' Union, the New Deal's promotion of union interests and the succession of strikes that have harassed the automobile manufacturers quite naturally have led to the conclusion that the industry is thoroughly organized.

Unbiased observers are convinced, however, that membership in unions still represents only a minority of the automobile workers. In their opinion, the recent tidal wave of unionism has reached its crest and evidence already has appeared that it has begun to recede. Union buttons are coming off the coat lapels of workers.

Chester M. Culver, general manager of the Detroit Employers Association, declared: "Union membership in the automobile industry has reached its peak, and I believe that every forward-looking employer will agree with this view." A well-known union leader, not connected with the UAW, says: "I am expecting any day that the bubble will burst."

senger cars. More than \$3,000,000,000 went for the purchase of 17,500,000,000 gal. of gasoline to operate the more than 28,000,000 vehicles now on American roads.

While the Department of Commerce has not yet published its national income figures for 1936, an official of the department informs AUTOMOTIVE INDUSTRIES that preliminary figures indicate that the amount produced and paid out for 1936 will be about the same as that for 1935—\$60,000,000,000.

A summary follows of how a sixth of this amount was spent by the public for automotive products.

Summary of 1936

\$2,630,000,000	bought 3,676,063 passenger cars (U. S. only)
585,000,000	bought 778,462 trucks (U. S. only)
3,404,000,000	bought 17,500,000,000 gal. of gasoline
540,000,000	bought 540,000,000 gal. of lubricants
324,000,000	bought replacement tires and tubes
667,000,000	bought replacement parts
200,000,000	bought accessories
1,670,000,000	bought service labor

\$10,020,000,000 total 1936 bill to American motorists

Is Detroit Really Unionized?

*Behind Today's Impressive Demonstration, There's
No True Union Sentiment, Say Observers*

Mr. Culver, in his 34 years connection with the Employers Association, has seen several union movements rise and fall. Samuel Gompers was in Detroit three times to inaugurate organization campaigns. William Green came twice. Culver saw the unions make rapid progress in the industry during the war when, inspired by patriotism and a desire to cooperate with the War Labor Board, employers readily signed agreements with the unions. The industry, at that time, was nearly as well organized as now. But the unions were unable to hold their membership. Again in 1933, after the President's agreement with the automobile manufacturers, the AFL attempted another drive. A year later, however, when the Labor Relations Board polled workers in all automobile plants, the union was found to have a pitifully small minority.

Admittedly the present campaign has been easily the most successful. Aided by their new implement, the illegal sit-down strike, the unions have herded large numbers of unwilling proselytes into their fold. By means of the sit-down, the union has been able to close plant after plant although, when the strikes were called, it controlled only a small percentage of the total workers in these plants. Once the strike was started, many employees signed up as a matter of self-protection to avoid persecution. Thus the union roster was padded with names of conscripts who become deserters as soon as pressure was lifted.

In the Detroit area, the actual dues-paying membership of the UAW is believed to be only a fraction of the 200,000 claimed by officials. One observer thinks it is less than one-third this number. A rival union leader estimates the figure at less than 30,000. He claims to have definite knowledge that the UAW issued only 11,000 stamps for last month's dues to members in Chrysler plants, whereas the union claims to have 90 per cent of the corporation's 60,000 workers. This same union leader said that there are scarcely any union men in the Pontiac plant. "We have only six members," he admitted, "and I doubt if the UAW can account for many more although it maintains a local office there."

Union members signed up under duress are quickly lost and it is reported that many who came in without coercion are finding monthly dues distasteful. Particularly are they scared away by talk of special assessments. Some workers have found that although their hourly wage rates have been raised by union agreements, their weekly pay checks are smaller due to reduction in hours. The General Motors settlement was far from an un-

alloyed union victory and many members are said to have been none too well pleased. An indication of what union men think of it is found in a statement of the competing union official who complained that wherever he attempted to negotiate agreements, the employers would trot out the GM pact as a model to limit the union demands. In his opinion, the seniority position of the GM employes is less favorable than before the settlement.

The UAW strike in Chrysler plants was called solely on the exclusive bargaining issue. The union's chances of gaining this end appear more slender each day. If its leaders come away from the conference with anything less, it will mean defeat however cleverly the compromise might be worded. Widespread dissatisfaction among its members is predicted. It could well prove to be a body blow to the union. In view of the time lost by the strikers, it would be a costly privilege even if they won, and no impartial observer can be found who will predict victory for the union.

These are some of the reasons why authorities believe that the union movement in the automobile industry is due to wane. Another reason is found in the inherent weakness of the industrial type of union. As Mr. Culver explains, the vertical union has within it the seed of its own defeat. It lacks the homogeneity necessary for success. Its membership is comprised of skilled, semi-skilled and unskilled workers. The first two classes form the big majority and often they constitute poor union material. This is particularly true in the automobile industry where the unskilled are the best paid workers of their class in the world. Except when stirred up by agitators, they are as a rule satisfied with pay and working conditions. It is difficult for union leaders to hold these workers in line. On the other hand, the skilled workers have little in common with the unskilled and have little to gain by joining with them.

According to Mr. Culver, the "one-big-union" idea has never succeeded. He pointed to the Knights of Labor organization of Clarence V. Powderly which gained considerable strength in the late 1870's but which broke up when Samuel Gompers came forward in the early 90's with his craft union idea. Later came the I.W.W. which also failed. "Now we see it being tried again," he said. "We have the spectacle of John L. Lewis, head of the poorest paid union workers in the country, attempting to organize workers in the highest paying industry in the world. But he will not be successful."

William H. Miller

William H. Miller, 67, manager of the agency sales department of Pratt & Whitney, division of Niles-Bement-Pond Co., and associated with Pratt & Whitney for 47 years, died March 26

in Unionville, Conn. Death was caused by coronary thrombosis.

Born in Liverpool, England, Mr. Miller moved to this country with his family when he was 12 years old. He entered the employ of Pratt & Whitney June 30, 1890, as an apprentice. For some years Mr. Miller was in the engineering department of Pratt & Whitney and then became manager of the foreign sales department. He became later sales manager for the entire company, and occupied this position for many years. For the past three years he was manager of the agency sales department, the position he held at the time of his death.

Mr. Miller is survived by his widow, Mrs. Erwina Zauche Miller; a daughter, Mrs. Herbert France; a son, William E. Miller, and eight grandchildren.



CHARLES F. KETTERING, General Motors research director, was honored with the Legion of Honour by Count Charles Ferry de Fountnouvelle, French Consul General, at the first international conference in fever therapy in New York, for his work in developing high frequency apparatus to induce artificial fevers.

ROY L. WARREN has been appointed director of purchases for the Covered Wagon Co., Detroit. For the past six years he had been a purchasing agent of the Briggs Mfg. Co., Detroit, and previously was with Locke & Co., Rochester, N. Y., and the Anderson Carriage Co., Detroit.

E. J. THOMAS, assistant to P. W. Litchfield, president of the Goodyear Tire & Rubber Co., was elected to the company's board of directors March 29 to succeed Newton D. Baker, former Secretary of War.

L. M. DREVES, a former regional manager for Pontiac, has been appointed to his company's central office sales staff on special assignment work.

BERNE I. SHOBE, general manager of Leibing Automotive Devices, Inc., Detroit, has been seriously ill in Ann Arbor Hospital, but is reported to be recovering.

:SLANTS:

SHOW FOLKS' TROUBLES—Shows traveling by car and truck have been badly hit this winter by Florida's motor license law, says "Variety." Companies are allowed to come in, play the state, and are told nothing about the requirements until about to leave when the sheriff catches 'em. One manager complains he had to pay \$27 for a light truck, plus \$9.55 in costs. But he got away with his cars which authorities didn't see and saved about \$100.

PICKED BOWLERS—Ten Chrysler bowlers, relieved from sitdown duty in the plants, came back into the Detroit bowling picture the next day. The 10 men are the pick of the 562 teams in the Chrysler organization, said to have the biggest group of bowlers in the country.

BALL TEAMS' FEUD—Managers of the New York and Brooklyn baseball teams, Bill Terry and Burleigh Grimes, will air their opinions of one another's teams over the Ford radio program April 20. That is the day the teams will play their opening game at Ebbetts Field, Brooklyn.

Reo Reports Loss

Largely Due to Dropping Passenger Car Line, Says Bates

The Reo Motor Car Co. and subsidiaries report for year ended Dec. 31, 1936, net loss of \$1,399,125 after taxes, depreciation and tool amortization, and extraordinary charges amounting to \$604,832 for moving expenses and for obsolescence of tools, dies and manufacturing materials in connection with discontinuance of passenger car manufacture. This compares with net loss of \$219,860 in 1935.

Current assets as of Dec. 31, 1936, including \$1,421,514 cash, government and other marketable securities, amounted to \$6,535,401 and current liabilities were \$1,246,528, compared with cash, government and other marketable securities of \$1,408,285, current assets of

Passenger Car and Truck Production—U. S. and Canada

	Feb., 1937	Jan., 1937	Feb., 1936	Two Months, 1937	1936
Passenger Cars—U. S. and Canada:					
Domestic Market—U. S.	276,229	285,892	204,681	562,121	485,649
Foreign Market—U. S.	20,258	23,702	20,135	43,960	37,441
Canada	14,415	15,009	10,853	29,424	22,114
Total	310,902	324,603	235,669	635,505	545,204
Trucks—U. S. and Canada:					
Domestic Market—U. S.	53,628	54,017	51,204	107,645	105,837
Foreign Market—U. S.	13,815	16,232	11,586	30,047	22,683
Canada	5,292	4,574	2,415	9,866	4,456
Total	72,735	74,823	65,205	147,558	132,976
Total—Domestic Market—U. S.	329,857	339,909	255,885	669,766	591,486
Total—Foreign Market—U. S.	34,073	39,934	31,721	74,007	60,124
Total—Canada	19,707	19,583	13,268	39,290	26,570
Total—Cars and Trucks—U. S. and Canada.	383,637	399,426	300,874	783,063	678,180

April 3, 1937

Automotive Industries

\$8,523,438 and current liabilities of \$2,038,737 at the end of the preceding year. Sales in 1936 totaled \$13,171,225, compared with \$16,135,552 in 1935.

During the last year the company abandoned the passenger car field to specialize in commercial vehicle production, supplemented by passenger buses.

D. E. Bates, president, stated: "It is felt that with the company's entire energies devoted to the more profitable commercial vehicles the prospects for the future are much brighter than they have been in any recent years." Unfilled orders on the books are the best in years, he says.

Federal Profits Higher

The Federal Motor Truck Co. and subsidiaries report a net profit of \$185,302 for 1936, equal to 37 cents a share. The previous year the net profit was \$144,296 or 30 cents a share.

Motor Products Nets \$3.51 a Share

Motor Products Corp. reports for the year ended Dec. 31, 1936, a net profit of \$1,372,160 after depreciation, provision for contingencies, interest, federal income taxes, and surtax on undistributed profits, equivalent to \$3.51 a share on 391,254 no-par shares of capital stock. This compares with \$1,079,640 or \$2.76 a share in 1935.

A. L. Lott, president, stated in a letter to stockholders, that sales volume for the past year exceeded that of 1935

by approximately 25 per cent.

Current assets as of Dec. 31, 1936, including \$3,355,921 cash and marketable securities, amounted to \$6,430,903 and current liabilities were \$2,109,307. This compares with cash and marketable securities of \$2,807,680, current assets of \$5,226,169 and current liabilities of \$1,552,049 at close of 1935.

What Is the Trailer's Place?

Not a Solution of Our Housing Problem, Says Expert, but Technical Contributions May Be Considerable

By Henry S. Churchill*

As told to Philip H. Smith

Tourist trailers do not afford a solution to the housing problem.

The real contribution that the tourist trailer has made is a technical one. It has been suggestive and stimulating to architects and students of housing. Perhaps its outstanding contribution will prove to be a new method for the disposal of sewage and garbage. The idea that sewage can be disposed of in a practical manner by local chemical reduction without use of septic tank or disposal plant holds out possibilities of enormous savings for communities which at present must employ very costly systems.

The utilization of space has also been suggestive. The accomplishments here, however, cannot be applied to any great extent in orthodox housing.

*Henry S. Churchill is an architect, graduate of Cornell; and he has specialized in housing problems for the last 10 years. Recently he was one of principal planners of the Greenbelt Towns intended for New Jersey (Bound Brook) by the Suburban Resettlement Division of the Resettlement Administration. He is the author of various studies of the economics of housing.

Economy of cost does not follow necessarily from economy of space. Where land is cheap, the trailer represents overcrowded quarters at high cost. A good trailer costs about \$1.50 per cu. ft., which is high by any standard.

There are certainly thousands of citizens with strong migratory instincts for whom the trailer will provide a satisfactory mode of living, but housing is not concerned with them. The housing problem relates to a far greater number of millions who are now forced to live in sub-standard dwellings and need permanent homes in a decent environment at low rental.

The need of millions is to be able to stay put, not to keep moving. The fact that employment has been dislocated so that thousands have kept in motion to seek jobs does not alter the problem. Such trouble is to be solved by bringing about a more stable organization of industrial employment, not by putting wheels under the workers.

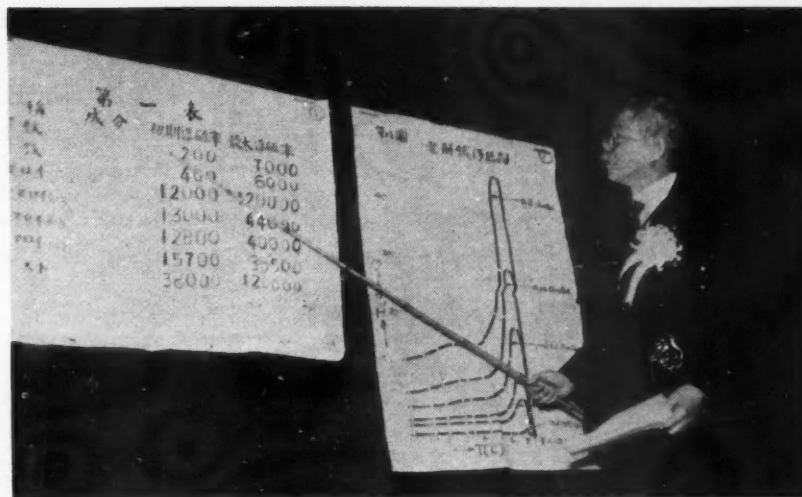
Agencies and individuals concerned with the great national problem of housing have not overlooked the trailer, nor resented it as a novelty. They have considered it from every angle

and have discarded it as illusory. They believe it much more likely to divert attention from the real goal than to aid in attaining it.

What has been overlooked—by the advocates of the trailer—is that any solution to the housing problem must consider society as a whole. From the social and political viewpoint any increase in the number of "floating citizens" is undesirable. What is needed is more personal responsibility toward the community and more community responsibility toward the person, resulting in stronger family and social ties, better schooling, and increased interest in government, local as well as national. It need hardly be added that a migratory population increases the tax burden of the non-migratory group. That this is true, is reflected in the rumble of legislation aimed at the trailer which followed swiftly upon the "escape" claims touted by trailer proponents.

The present trend toward more completely equipped trailers, with all "home" conveniences except real comfort and privacy, may run into a snag if paper dreams are translated into tangible form. The first obstacle will be mounting costs which will defeat economy; the second, the complication in gadgets which will require expert servicing.

It would be well before getting too worked up about the trailer either as a "menace" or a "solution" to have substantial data on whether it is as economical as claimed. What does it cost to operate one, in gasoline, tires, license, insurance, parking rent? What does it cost to maintain one for, say, three years, in repairs, replacements, depreciation, obsolescence? It may just be that, all factors properly considered, the newest "escape" is like all other mechanical escapes—illusory.



Dr. Kotaro Honda, director of the Research Institute for Iron and Other Metals, at Tohoku Imperial University, Sendai, Japan, is considered the greatest living metallurgist of his country. He developed the "K. S.," "New K. S." and other alloys of unsurpassed magnetic qualities which have found wide application in automotive electrical engineering. The "Thom" superstrength steel recently developed by Dr. Honda and associates, is now being produced by the Nippon Kako.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES

Despite the continuation of widespread labor disturbances, general business was active last week. Easter trade was heavy, and further gains in retail business are anticipated. Factory payrolls around the middle of February were the highest since April, 1930, while employment in manufacturing industries was the highest since 1929.

Business Index Rises

The Guaranty Trust Co.'s index of business activity for February stood at the preliminary figure of 93.4, as against 90.8 the month before and 79.5 for the corresponding period last year. The company's index of wholesale commodity prices on March 15 was 89.7, as against 84.1 the week before and 69.3 a year ago.

Freight Shipments Higher

Railway freight loadings during the week ended March 20 amounted to 759,269 cars, which marks an increase of 10,276 cars above those in the preceding week, a gain of 190,418 cars above those a year ago, and a rise of 152,091 cars above those two years ago.

More Crude Oil Produced

Average daily crude oil production during the week ended March 20 amounted to 3,448,150 bbl., as against 3,374,850 bbl. the week before and 2,835,950 bbl. a year ago.

Power Output Up 16%

Production of electricity by the electric light and power industry in the

United States during the week ended March 20 was 16.3 per cent above that in the corresponding period last year.

Lumber Production Steady

Production of lumber during the week ended March 13 was 62 per cent of the 1929 weekly average. New orders were the highest for any week this year, and shipments were maintained at the high levels of the four weeks preceding.

Life Insurance Sales Better

Sales of life insurance in the United States during February were six per cent above those a year ago. Sales during the first two months of this year were only two per cent above those in the corresponding period last year.

Fisher's Index

Professor Fisher's Index of wholesale commodity prices for the week ended March 27 stood at 94.4, as against 93.7 the week before and 92.9 two weeks before.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended March 24 showed an increase of \$4,000,000 in holdings of discounted bills. Holdings of bills bought in the open market and Government securities remained unchanged. Money in circulation declined \$10,000,000, and the monetary gold stock rose \$26,000,000.

Graham Cuts Loss

Equal to 17.9 Cents per Share, Gross Profit Was Over a Million

Graham-Paige Motors Corp. reports net loss of 17.9 cents per share on 2,809,182 shares against net loss of 72.8 cents per share on 2,387,409 shares in 1935. Gross profits for the year before depreciation were \$1,070,760.24, with net loss after depreciation of \$282,538.09, and dies and tool amortization of \$344,963.24. The financial structure was strengthened during the year by an increase of \$647,230.61 in surplus and an increase of \$654,493.94 in working capital.

A substantial sum was received from the sale of dies, tools and equipment to Nissan Jidosha Kaisha, Ltd., Japan, with which Graham-Paige has entered into an agreement which promises to be mutually beneficial in the future.

During 1936 the company, "looking to the future rather than the immediate present," concentrated all manufacturing activities in the main plant in Detroit. "The wisdom of this extensive undertaking, while it temporarily curtailed production and earnings, as anticipated, has already been confirmed. It not only will result in annual savings of operating costs estimated to exceed \$400,000, but its effectiveness was apparent in a profitable production of 7005 cars during the

fourth quarter of 1936," Joseph B. Graham, president, stated in his report.

The increasing demand for the Supercharger models resulted in the dollar volume for 1936 exceeding the dollar volume of 1935, although unit volume, largely because of the anticipated curtailment while the concentration plan was being carried through, was lower. The figures were: 1936, \$15,634,716.22; 1935, \$14,621,785.12; unit volume, 1936, 22,368; 1935, 22,704.

German and Italian Teams Prepare for European Races

Mercedes-Benz, Auto Union and Alfa Romeo will be the three teams competing in the leading European races during the coming season. Bugatti is expected to start one car in a few of the more important races. The 16-cylinder rear engine Auto Union racers have undergone little change since last year. The Mercedes-Benz have been entirely rebuilt under the direction of Engineer Rohr. Piston displacement which last year was 4700 cu. cm. has been increased to about 6000 cu. cm. and the extra weight put in the engine has been gained on the chassis, which has an entirely new front suspension.

Alfa Romeo will race with 12-cylinder models similar to the one which won at Roosevelt Raceway last

year, but with increased piston displacement and numerous detail refinements. Bugatti will race with the straight eight which was second last year in the Vanderbilt race.

This is the last year under the 750 kg. maximum weight rule, and as a consequence the present cars will be abandoned at the end of the season. It appears to be the intention of the race organizations to build two types of engines next year, one with the maximum of 183 cu. in. supercharged, and the other with the maximum of 274.6 cu. in. non-supercharged. Delage will produce a 183 cu. in. supercharged rear engine job. The French Talbot and the Delahaye companies are both expected to build racing cars under the 1938 formula.

Automotive Broadcasts

Rubinoff and his orchestra will continue to broadcast over the Columbia network for the Chevrolet Motor Co., through a contract renewal just made effective. Directly following the broadcast of April 11, Rubinoff leaves for the West Coast, and the program, originating in Hollywood, will offer a weekly guest-star presented by Rubinoff. It is heard every Sunday from 6.30 to 7.00 p.m., EST.

McCabe Keeps Post

Glen W. McCabe, president of the Federation of Flat Glass Workers against whom ouster proceedings were taken by his union as an aftermath of the plate glass strikes last fall, won his battle to keep the office. It required a two-thirds vote to oust him. He polled 6796 votes and the ouster won 4649. The union claims a 17,000 membership.

40 Years Ago

with the ancestors of
AUTOMOTIVE INDUSTRIES

Minor Mention

The Winton Motor Carriage Co., Cleveland, Ohio, are now working 12 hours a day.

The "John Scott Legacy Medal and Premium" of the Franklin Institute, Philadelphia, Pa., has been awarded to Henry G. Morris and Pedro G. Salom, designers of the electric vehicles patented under their names.

The motor vehicle bill which was reported as before the Massachusetts Legislature seems to have been tabled, as nothing further has ever been heard of it. Influences antagonistic to the new vehicle could probably explain.

George Henry Hewitt, president, and J. Frank Duryea, superintendent, of the Duryea Motor Car Co., Springfield, Mass., have sailed for Europe to look after the foreign interests of the company.

—From *The Horseless Age*, April 1897.

April 3, 1937

Automotive Industries

Automotive Metal Markets

Extra Pay for Time Over 40 Hours Brings Cost Problem to Steel Mills Already Running at Capacity

By William Crawford Hirsch

With enough orders on their books to make certain of a high operating rate throughout the year's second quarter, steel producers are still more or less in the dark as to how much will be added to their costs as the result of the time and a half to be paid to those working more than eight hours in any one day or more than 40 hours in a week.

Camouflaged in last month's wage agreement as a harmless appearing provision for extra compensation in emergencies, when operatives might be asked to do more than their usual stint, this arrangement has already been found in practice to entail a much more serious problem than the general advance in wages that went into effect at the same time. The overtime provision applies to all but blast furnace labor, and inasmuch as all steel mills are running three eight-hour shifts a day, some the full seven days of the week, the 40-hour week has become merely a basis for computing what overtime all of the mill workers put in.

It would require between 25 and 30 per cent more steel workers than are now available to make the five-day or 40-hour week an actuality instead of, what it is today, a costly theory. Because of having to allow for roll changes, manually operated sheet mills can at best work only six days a week. Production experts and cost accountants are tackling in earnest the problems engendered by the overtime clause of the C.I.O. agreement, and there are those who predict that their studies will reveal an entirely new competitive factor, some mills being very likely in much better position to pay overtime than others.

(Turn to page 541, please)

States Pass ICC Laws

Motor Carrier Safety Regulations Already Adopted by Five

Five states have already conformed and 28 other states are planning to conform with the safety regulations adopted for interstate carriers under the Federal Motor Carrier Act, according to reports received by the Motor Carrier Bureau of the Interstate Commerce Commission.

The first five states to effect uniformity in safety regulations were Georgia, Kansas, Kentucky, Mississippi and Tennessee.

Thirteen states are reported planning to adopt conforming regulations. They are: Florida, Indiana, Iowa, Missouri, Nebraska, Ohio, Oklahoma, Oregon, South Dakota, Texas, West Virginia, Wisconsin, and District of Columbia.

Fifteen states reported no material conflict with the intent and scope of the

ICC safety regulations and this friendly attitude is expected to be followed by adoption. The states are: Arizona, Arkansas, California, Connecticut, Maine, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Pennsylvania and Vermont.

Jap Piston Ring Company Will Also Make Bearings

The Riken Piston Ring Company will soon inaugurate its new factory at Oji, near Tokyo, which will manufacture piston rings for automobiles and aircraft engines. Another important product of this factory will be automotive ball and roller bearings, for which Riken has been making preparations for some time.

The Riken Piston Co. is the commercial branch of the Rikagaku Kenkyusho, or Institute for Physical and Chemical Research. Not only has it successfully produced Riken discoveries on a commercial basis, but it has also contributed funds out of

its profits to further the scientific activities of the Institute. This firm exported some 400,000 piston rings of various sizes to the United States and other countries in 1936, according to the Tokyo Keizai Shimpō.

Station Wagon Added To Terraplane Line

A station wagon as the newest addition to the Terraplane line of commercial cars has been announced by the Hudson Motor Car Co. The combination commercial and passenger vehicle will carry eight passengers and provide ample room for luggage. It has three seats, two of which can be removed when the car is to be used exclusively for light truck duty.

The doors, side panels and the tail gate are of hard-wood in natural finish. The car is built on a 117-in. wheelbase and has an overall length of 196½ in.

Automobiles Take 20% of Sheets

During 1936, 20.3 per cent of the American Rolling Mill Co.'s production of sheet steel was consumed by the automotive industry, according to the company's annual report, released March 30.

Gasoline Consumption by States*

	1936	1935	Per Cent Increase
Alabama	203,384,000	172,446,000	17.9
Arizona	95,648,000	80,994,000	18.1
Arkansas	154,727,000	143,379,000	7.9
California	1,625,794,000	1,482,211,000	9.6
Colorado	205,913,000	182,367,000	12.9
Connecticut	294,455,000	269,871,000	9.1
Delaware	50,772,000	45,398,000	11.8
Dist. of Columbia	126,834,000	116,274,000	9.0
Florida	310,472,000	298,696,000	3.9
Georgia	296,314,000	268,530,000	10.3
Idaho	87,370,000	72,635,000	20.2
Illinois	1,191,916,000	1,069,243,000	11.4
Indiana	561,132,000	496,835,000	12.9
Iowa	460,086,000	421,152,000	9.2
Kansas	450,330,000	408,707,000	10.2
Kentucky	228,335,000	201,325,000	13.4
Louisiana	216,430,000	189,502,000	14.2
Maine	134,521,000	121,109,000	11.0
Maryland	244,761,000	217,665,000	12.4
Massachusetts	656,318,000	610,797,000	7.4
Michigan	995,629,000	885,244,000	12.4
Minnesota	480,873,000	442,769,000	8.6
Mississippi	163,795,000	145,120,000	12.8
Missouri	561,796,000	511,835,000	9.7
Montana	108,963,000	96,326,000	13.1
Nebraska	230,951,000	231,602,000	-0.3
Nevada	34,227,000	30,164,000	13.4
New Hampshire	80,898,000	73,904,000	9.5
New Jersey	745,482,000	695,772,000	7.1
New Mexico	75,849,000	62,340,000	21.6
New York	1,721,831,000	1,610,544,000	6.9
North Carolina	348,154,000	309,800,000	12.4
North Dakota	11,373,000	120,077,000	-7.3
Ohio	1,165,834,000	1,044,529,000	11.6
Oklahoma	366,591,000	330,507,000	10.9
Oregon	216,582,000	186,629,000	16.0
Pennsylvania	1,233,280,000	1,177,719,000	8.9
Rhode Island	118,385,000	109,408,000	8.2
South Carolina	164,177,000	144,723,000	13.4
South Dakota	113,381,000	118,967,000	-4.7
Tennessee	263,583,000	224,355,000	17.4
Texas	1,096,238,000	959,549,000	14.2
Utah	81,848,000	71,065,000	15.1
Vermont	59,936,000	52,604,000	13.9
Virginia	316,685,000	282,413,000	12.1
Washington	319,285,000	278,672,000	14.5
West Virginia	181,891,000	159,090,000	14.3
Wisconsin	504,259,000	442,444,000	13.9
Wyoming	58,634,000	49,498,000	18.4
TOTAL	19,565,922,000	17,716,811,000	10.4

* As furnished by the American Petroleum Institute. Figures corrected to include 12 months and replace table on page 277, Automotive Industries, Feb. 27, 1937.

Murphy Hopes for Early Settlement

(Continued from page 511)

Governor Murphy is of the opinion that out of the Chrysler negotiations will come a formula for settling the Hudson and Reo strikes. "I believe that the others are waiting for the outcome of present negotiations," said Murphy. "In the event that the others have not come to an agreement by the time the Chrysler strike is settled, we will help them. I believe that most motor labor difficulties will be solved when we find the answer to the situation that we are working on now." Reo officials are negotiating with the union but Hudson conferences have not been resumed since they ended in disagreement nearly three weeks ago.

As an answer and cross-bill to the original petition of the company for an injunction against strikers, UAW attorneys filed a petition asking a mandatory injunction to restrain the Chrysler Corp. from violating the Wagner Act by hiring spies, interfering with rights of men to organize and discriminating against union members. They also ask that the company be forced to bargain with the UAW as the sole bargaining agency.

Chrysler plants at Windsor, Ont., were forced to close Tuesday due to shortage of materials imported from Detroit plants which are idle because of the strike. More than 2000 Canadian workers are being laid off.

B. E. Hutchinson, chairman of the finance committee, Chrysler Corp. issued the following statement:

"The strike at our plants having interrupted the building and shipping of automobiles, and the receiving of material, and made unnecessary the usual clerical and accounting work and many other of the varied activities incidental to the conduct of a going business, it is naturally necessary for us to limit future commitments and make a most serious effort to reduce expenses in every practical way.

"Consistent with this policy toward the problem which the strike presents to us, we have found it necessary to lay off many of our salaried employees and reduce the compensation paid to others retained to perform necessary service during this shut-down period. This corporation's payrolls must be earned through the sale of its products to the public. This source of income having ceased, payrolls, both salaried and hourly, have of necessity to be adjusted accordingly."

Two more unauthorized strikes interrupted production in General Motors plants. At the Chevrolet small parts plant in Bay City, several hundred workers staged a two-hour sitdown. When union representatives were late for a conference scheduled for 10 a. m., strikers began throwing off power switches and approximately 500 sat down. The plant employs over 2000 workers. Strikers left the plant when arrangements were made for another meeting with the management.

Discharge of a worker at the Fisher Body plant in Oakland, Calif., brought a sitdown of some 200 employees Monday morning. Prompt settlement was effected. This was the fourth strike in GM plants since the corporation's agreement with the union which was to have outlawed sitdowns.

New sitdown strikes in five GM plants and the resultant closing of two others Thursday morning forced about 25,000 employees into temporary idleness. Sitdowns at Chevrolet plants Nos. 2 and 3 in Flint caused the closing of the Fisher plant which supplies bodies, while in Pontiac a strike in the Fisher plant forced the Pontiac assembly line to suspend. The plant of the Yellow Truck & Coach Co., controlled by GM, in the same city, also was hit by a sitdown strike which threw 6500 employees out of work. At Cleveland, a two-hour strike interrupted operations in the Fisher plant early Thursday morning.

Various complaints were made such as intimidation and dissatisfaction with the representation system. Under the agreement which settled the big GM strike, provision was made for shop committees with from five to nine members to represent employees in the various plants. Union workers now complain that the representation is inadequate and want to return to the shop steward system which they had set up in many of the plants before the strike.

Union leaders claim the strikes were spontaneous and are attempting to iron out the difficulties. Arrangements were being made for the UAW president, Homer Martin, to meet with W. S. Knudsen of GM as soon as Martin returned from Gillespie, Ill., where he addressed a meeting of the Progressive Miners Union.

The UAW announced that 125 men had sat down at the Buell Die & Machine Co. Monday protesting the discharge of several shop stewards which the union claimed had been given seniority rights over all other

employees in an agreement reached two weeks ago.

After defying a circuit court injunction since Monday, sitdown strikers left the Square D plant Wednesday when the company agreed to recognize the UAW as bargaining agency for its members and other employees who so designate. Approximately 400 strikers had held the factory since March 11.

Strikers at the National Smelting and Refining Co. in Ecorse continued to occupy the plant Wednesday afternoon in defiance of an injunction ordering them to leave by noon. Eighteen sitdowners have held the plant since March 14.

A strike was started at the National Stamping Co. Wednesday by die makers, members of the Mechanics Educational Society of America, who are asking recognition of their union. This action developed into a quarrel between the MESA and the UAW, the latter claiming a closed shop agreement with the company. Officials of both unions have issued statements accusing each other of scabbing and using gangster methods.

Mullins Stock to Pay for Youngstown Pressed Steel

Mullins Manufacturing Corp. plans to declare a 100 per cent stock dividend to holders of the B shares, and to pay 200,000 shares of B stock to the Sharon Steel Corp. for the purchase of the Youngstown Pressed Metal Co. The company will retire its class A stock of which only a few shares remain. No additional financing will be required for the acquisition of the metal company. The deal will broaden Mullins' activities considerably.

Andrew McLeod, secretary-treasurer of Mullins, in announcing the plan, said that Mullins' earnings for the first quarter of 1937 would run from 15 to 20 per cent over the first quarter of last year. The deal will give Sharon Steel a 35 per cent interest in the re-capitalized Mullins company.

U. S. New Car Registrations and Estimated Dollar Volume—By Retail Price Classes*

January, 1937

	Units	Estimated Dollar Volume
Chevrolet, Ford and Plymouth	166,708	\$115,626,000
Others under \$750	2,573	1,461,000
\$750-\$1,000	94,738	82,594,000
\$1,000-\$1,500	13,772	16,589,000
\$1,500-\$2,000	1,224	2,105,000
\$2,000-\$3,000	1,054	2,780,000
\$3,000 and over	281	1,152,000
Total	280,350	\$222,307,000
Miscellaneous	265	
Total	280,615	

* All calculations are based on delivered price at factory of the five-passenger, four-door sedan, in conjunction with actual new car registrations of each model. The total dollar volumes are then consolidated by price classes. No comparative data with a year ago are available due to the change in the listing of the prices from the old F.O.B. which did not include certain standard equipment, to the new delivered prices which include standard equipment, federal taxes but no transportation charges.

Letters

to AUTOMOTIVE INDUSTRIES

Two-Passenger Car

I believe that there is a big field in the U. S. for the development of a car designed throughout solely for two passengers that could be sold and operated much cheaper than the chassis designed for five persons with a two-passenger body. For immediate experiment, I propose a three-wheel car with conventional rear axle, front wheel in center, 9.00 in. tires and springless attachment of frame to axles.

JOHN E. WHITESIDE.

Hazards of New Models

Cheers for Lee Oldfield for daring to comment that slow steering and nose-heavy

balance make a car dangerous in an emergency. To which it might be added that soft springs combined with inadequate shock absorbers do not help the situation any.

Another feature which must contribute materially to the accident rate is poor visibility. While the experts may learn where that invisible off-side mudguard is (preferably on a fence rather than a pedestrian) a large number of drivers, if not a vast majority, will never become expert. Consequently they keep safely away from the ditch, reducing the capacity of wide roads, and having head-on collisions on all roads.

The accident rate figures cited by Mr. Blanchard show that the rate is becoming progressively higher with the newer cars. I submit that poor visibility, slow steering, excessively soft suspension and improper weight distribution are major reasons why modern cars are dangerous.

E. R. MORTON, M.E.

A letter from Lee Oldfield criticizing features of late model design was published in AUTOMOTIVE INDUSTRIES, Jan. 23, 1937, page 123.



The Dependable Diesel, an elaborate and intelligent presentation by the Cummins Engine Co. of its Diesels in use in many fields; including some information on the Cummins Model VL 12, which delivers 500 hp. at 1000 r.p.m. Easily one of the best general interest Diesel presentations which has come to our notice, this brochure belongs in every Diesel file.*

A folder, containing 25 reproductions of photographs, showing installations of transmission belts in a variety of industries, has been released by United States Rubber Products, Inc., New York.*

A brochure, entitled *Panorama of Lubrication*, which presents in "layman" language a rather comprehensive picture of the developments in manufacturing and testing lubricating oils up to the present, has been published by the Shell Petroleum Corp., St. Louis, Mo.

A bulletin, describing a new type of feed finger for feeding stock on automatic screw machines, has been issued by the Eastern Machine Screw Corp., New Haven, Conn.*

The Bristol Co., Waterbury, Conn., has published an 8-page bulletin on its new line of low range pressure and draft recorders and controllers.*

The Temperature Research Foundation of Nash-Kelvinator Corp., New York, has brought out a booklet which gives a brief factual survey of the principles and history of refrigeration. The booklet is entitled "Yesterday and Today in Refrigeration."*

A new report issued by the Metropolitan Life Insurance Co., New York, describes various methods used in making company financial statements clear to employees. Included in "Interpreting Company Financial Statements for Employees" are explanations of simplification of language used in the customary stockholder report, the question and answer method illustrations of the statement through the mediums of tables and charts, and statements broken down on a "per employee" basis.*

* Obtainable from editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia.

Calendar of Coming Events

SHOWS

- Yugoslavia, 14th Automobile Salon, Zagreb April 17-26
- Illinois Automotive Ass'n, 4th Annual Show and Maintenance Exhibit, Navy Pier, Chicago Apr. 24-28
- Poland, Automobile Salon—16th International Fair, Poznan May 1-10
- Norway, Automobile Salon—Oslo, May 7-10
- Second Annual Automobile Maintenance Show, San Francisco, May 20-23
- Morocco, Automobile Section, Tangier Fair, Tangier June
- France, Automobile Section, Bordeaux Fair, Bordeaux June 13-28
- Belgium, First International Aeronautical Salon, Brussels June 18-30
- Fourth ASTM Exhibit of Testing Apparatus and Related Equipment, New York June 28-July 2
- Poland, Automobile Salon (Poloire Orientale), Lwow Sept. 1-15
- France, 31st International Automobile Salon, Paris Oct. 7-17
- Great Britain, 31st International Automobile Exposition, London... Oct. 14-23

Show Business

Manager of the National Automobile Show in New York is Alfred Reeves, 366 Madison Ave., N.Y.C. Inquiries concerning all matters connected with the national show should be addressed to him. AUTOMOTIVE INDUSTRIES will be pleased to furnish names and addresses of local show managers on request.

- National Automobile Show, New York, Oct. 27-Nov. 3
- Italy, 10th International Automobile Salon, Milan Oct. 28-Nov. 8
- Buffalo, N. Y., Automobile Show, Oct. 30-Nov. 6
- Cincinnati Automobile Show, Oct. 31-Nov. 6
- Great Britain, 13th International Commercial Automobile Exposition (trucks and buses), London, Nov. 4-13
- Chicago Automobile Show Nov. 6-13
- Akron Automobile Show Nov. 6-13
- Brooklyn Automobile Show Nov. 6-13
- Columbus Automobile Show Nov. 6-13
- Detroit Automobile Show Nov. 6-13
- Kansas City, Mo., Automobile Show, Nov. 6-13
- Motor Truck Show, 4th Annual, Newark, N. J. Nov. 6-12
- Newark, N. J., Automobile Show, Nov. 6-13
- Philadelphia Automobile Show... Nov. 6-13
- Pittsburgh, Pa., Automobile Show, Nov. 6-13
- Toronto, Ont., Automobile Show... Nov. 6-13
- Great Britain, 36th Scottish International Automobile Exposition, Glasgow Nov. 12-20
- Baltimore, Md., Automobile Show, Nov. 13-20

- Cleveland, Ohio, Automobile Show, Nov. 13-20
- Jersey City, N. J., Automobile Show, Nov. 13-20
- Milwaukee, Wis., Automobile Show, Nov. 13-20
- Springfield, Mass., Automobile Show, Nov. 14-20
- St. Louis, Mo., Automobile Show, Nov. 14-21

CONVENTIONS AND MEETINGS

- S.A.E. Regional Transportation and Maintenance Public Utility Meeting, Baltimore, Md. April 15-16
- International Association for Testing Materials, Second International Congress, London, England, April 19-24
- S.A.E. National Tractor and Industrial Power Meeting, Peoria, Ill. April 21-23
- National Machine Tool Builders' Association, Spring Convention, Edgewater Beach Hotel, Chicago.... May 3-4
- 41st Annual Convention and Exposition of the American Foundrymen's Association, Milwaukee May 3-7
- S.A.E. Summer Meeting, White Sulphur Springs, W. Va. May 4-9
- National Battery Manufacturers Assn., Spring Convention, Shoreham Hotel, Washington, D. C. May 13-14
- American Society of Mechanical Engineers, spring convention, Detroit, May 17-21
- National Association of Purchasing Agents, 22nd Annual Convention, William Penn Hotel, Pittsburgh, Pa. May 24-27
- American Petroleum Institute, Mid-Year Meeting, Colorado Springs, Colo. June 1-3
- Second World Petroleum Congress, Paris, France... late May—early June
- Automotive Engine Rebuilders Association, 15th Annual Convention, Chicago June 21-24
- American Society for Testing Materials, 40th Annual Meeting, New York, June 28-July 2
- S.A.E. National Aircraft Production Meeting, Los Angeles, Calif. Oct. 7-9
- S.A.E. Annual Dinner, Commodore Hotel, New York Oct. 23
- American Petroleum Institute, 18th Annual Meeting, Stevens Hotel, Chicago Nov. 9-12
- SAE National Production Meeting, Flint, Mich. Dec. 8-10

CONTESTS

- Indianapolis Speedway, 500-Mile International Sweepstakes May 31
- 31st Annual Grand Prix of the Automobile Club of France, Linas-Monthéry July 4
- Pan American Cup Race, Roosevelt Raceway July 5
- National and International Soap Box Derby Finals, Akron, Ohio Aug. 15
- Roosevelt Raceway, 400-Mile George Vanderbilt Cup Sweepstakes... Sept. 6
- Los Angeles, 500-Mile International Sweepstakes Nov. 23

General Motors Films Mexican Highway Scenes

General Motors of Mexico has completed 20,000 ft. of a series of movie shorts depicting a journey along the highway between Mexico City and Laredo, Tex., together with points of tourist interest along the route and in nearby communities. The pictures, which cost some \$90,000, were made under the supervision of G. R. Browder, a General Motors executive, by Hollywood cameramen and with the cooperation of the Mexican Government.

The pictures are to be exhibited in thousands of American cinemas as part of General Motors' campaign to induce more motorists to travel to Mexico from the United States.

Synthane Names Borden in Detroit

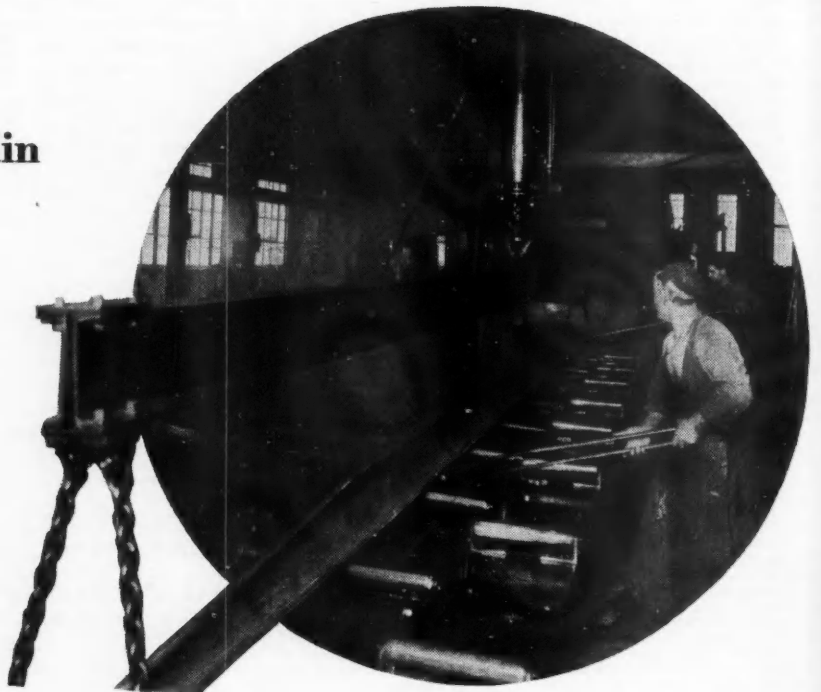
The Synthane Corp. of Oaks, Pa., manufacturers of laminated bakelite, announce the appointment of William H. Borden as their Detroit representative. Mr. Borden, until his appointment, represented the company in Pittsburgh.

Flexibility of Production a

By Joseph Geschelin

SPICER MFG. CORP., with headquarters in Toledo, one of the oldest names in the automotive industry, provides an excellent example of what it takes in thinking, engineering research, and production facilities to maintain leadership as a prominent parts supplier.

It takes an intimate knowledge of the problems of a parts maker to appreciate the complexities and ramifica-



Heat treated side rails made by Parish are quenched after heat treatment. View shows operators removing side rail from tank

Factory Executive Personnel

TOLEDO PLANT

R. E. Carpenter	Vice-President and General Manager
J. E. Padgett	Vice-President in Charge of Engineering
E. C. Mogford	Vice-President in Charge of Operations
E. C. Sudhoff	Director of Purchases
D. M. Snyder	Production Superintendent
Roy Garner	Chief Inspector
R. B. Haynes	Master Mechanic

POTTSTOWN PLANT

J. N. Bohannon	Plant Manager
Roy Hoel	Chief Inspector
C. M. Shaner	Superintendent of Production
M. Proctor	Chief Tool Designer
B. M. Smith	Tool Engineer Planning & Tool Design
L. P. Desprez	Superintendent of Maintenance

PARISH FRAME PLANT AT READING

H. S. Lewis	Vice President and General Manager
M. L. Fox	Chief Engineer
J. B. Marquette	Purchasing Agent
H. E. Sibbrel	Superintendent

tions of an organization of this kind. Consider first that although the parts supplier serves what is essentially the the biggest mass production industry in the world, his own manufacturing scheme holds little that is truly mass production. Despite that fact, not only does he have to meet the cost requirements of his customers but is constantly seeking ways and means of improving both the product and its cost of production.

In serving a large industry embracing passenger cars in every price category, motor trucks and industrial equipment of every size, and various specialties, the parts maker acquires a varied line of products, many dissimilar, while even the similar items vary in size or detail. Although the standardization of at least the small details and fastenings is a saving grace, the manufacturer finds it necessary to set up many parts in job-lot

at the Spicer Plant

THIS IS THE TWELFTH IN
THE SERIES OF MONTHLY
PRODUCTION FEATURES.

attributed to a coordination of product design and pro- duction technique

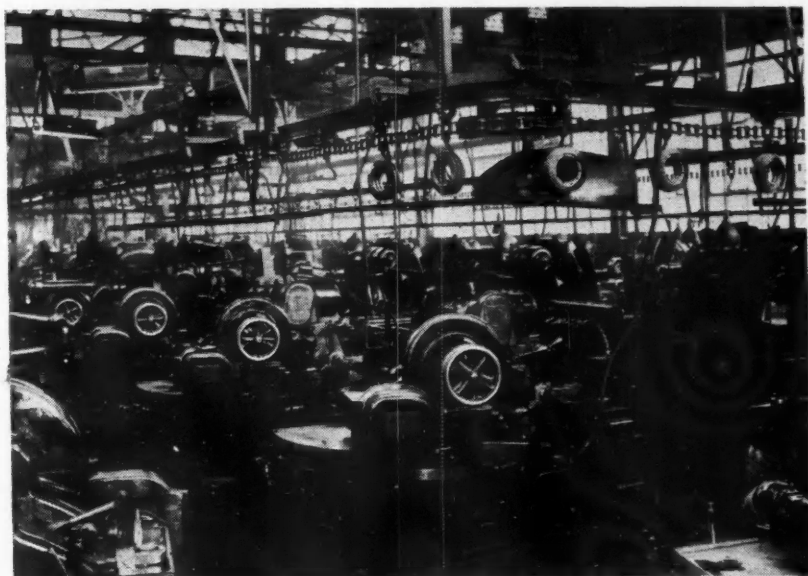
production, some parts as job-mass production, and in only a few cases is he fortunate enough to make mass production set-ups. The situation is further complicated by the fact that the customer is the sole judge of sales releases and may make changes at almost any stage of the game.

We mention the foregoing only to stress the point that the dominating

attribute of the successful parts producer is *flexibility* in every phase of his operation. As this analysis devel-

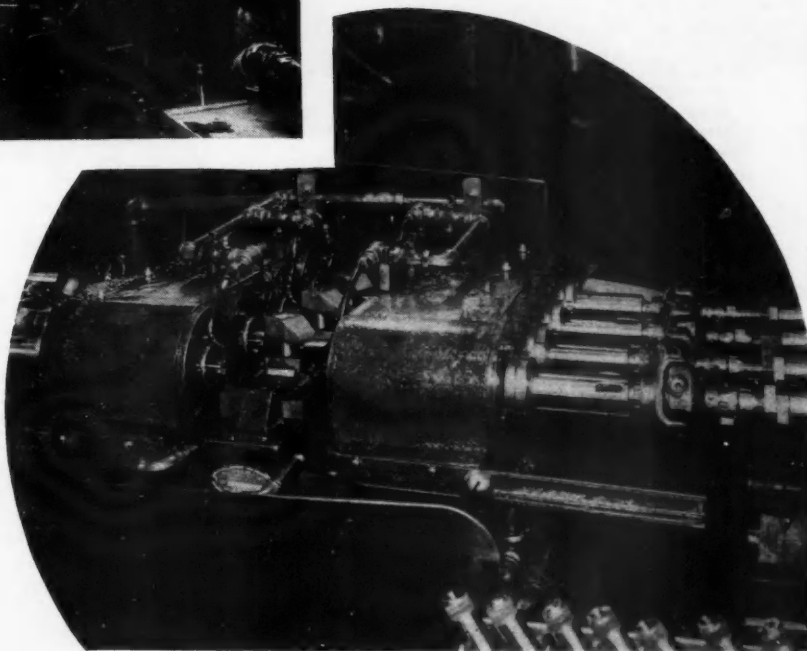
ops, the reader may note that Spicer does indeed possess this attribute to a remarkable degree. Suffice it to say at the moment that this company has so arranged its production facilities as to accommodate a variable demand ranging from 25 special bus transmissions a year to 8000 shock absorbers per day. If we examine the nature of the product even more intimately we find that the total number of component parts approximates 6500 items.

It is obvious that flexibility at Spicer has unusual significance. While it extends to the philosophy of manufacturing, even that would be insufficient without the impetus of a widespread program of engineering research and



General view in Toledo gear cutting department showing new overhead conveyor for transporting hypoid ring gears from this department to the heat treat

Double-end 8-spindle Fox automatic machine is used to drill, rough thread, and finish counterbore in wing-shaft



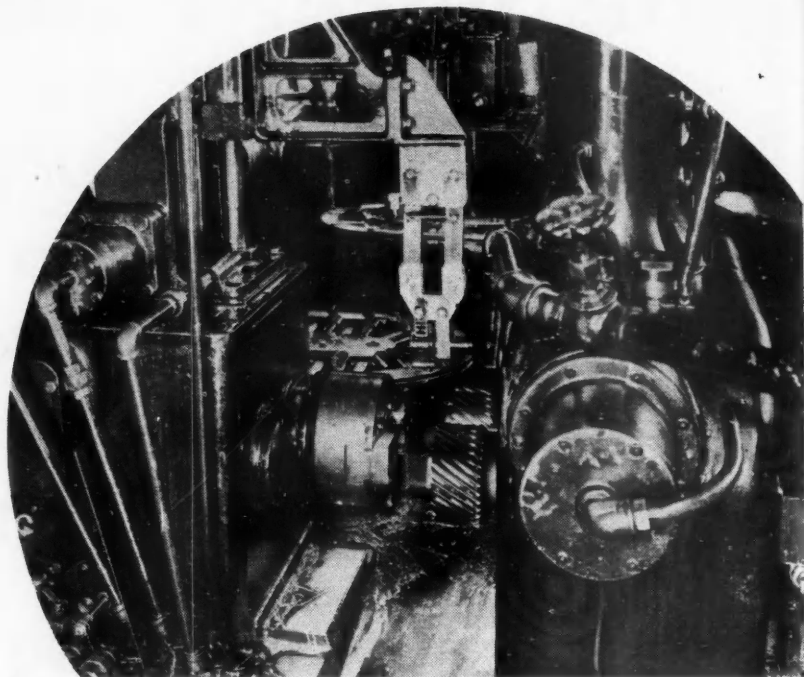
experimentation coordinating both product design and production techniques. However, it is because of flexibility in the manufacturing set-up that engineering advances can be made wherever and whenever indicated without waiting for a set-up to run through a complete season.

Spicer operates a number of independent manufacturing establishments in addition to its main plant in Toledo. These include—the high-production universal joint plant in Pottstown, Pa.; the Parish frame plant in Reading, Pa., which supplies the heat-treated chassis frames for buses and motor trucks; and the Brown-Lipe transmission plant in Syracuse, N. Y.

In addition, Spicer is affiliated with the Hardy Spicer Co., Ltd., of England, and Soci  t   Glaenzer of France, both of whom build Spicer products for European automotive manufacturers.

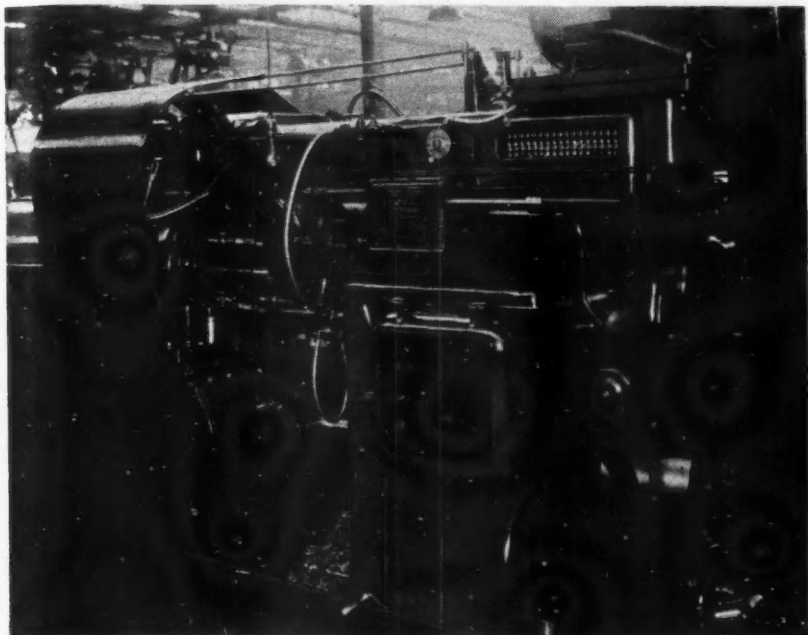
The principal items made for the industry by the Toledo organization

Turn-milling which had its inception at the Toledo plant is used for rough turning of wingshaft stem. Work is loaded in the automatic magazine seen in the rear and carried into the machine chuck by the automatic loading arm, in center. The turn-milling cutters are plainly in view



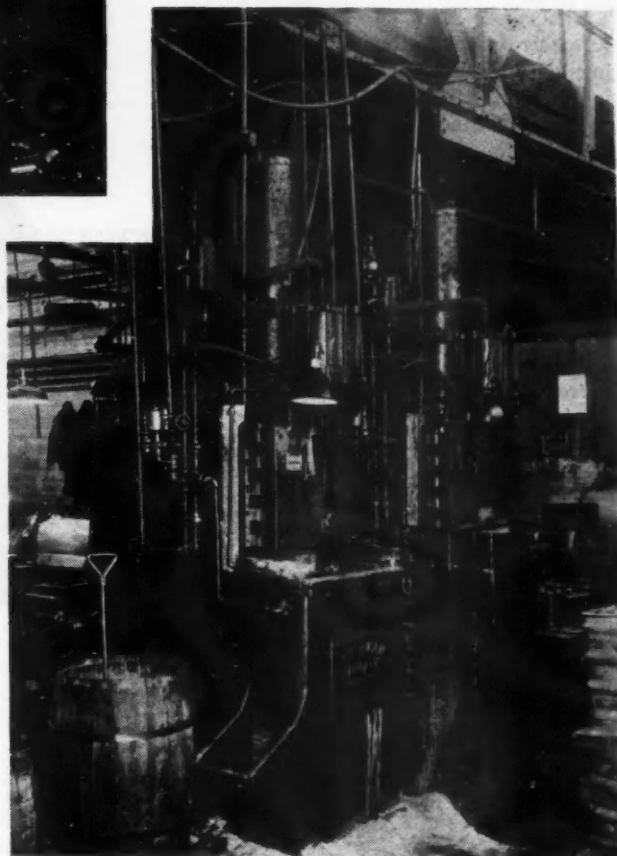
Spicer Factory Routing Shock Absorber-Wingshaft

OPERATION	EQUIPMENT	OPERATION	EQUIPMENT
Broach both ends and top of wing for rough length	18 in. American vertical broach	Drill 17/32 in. hole part depth, rough thread hole and finish 9/16 in. counterbore	8-spindle Fox automatic
Note: Material is HR steel type FFF. Metal removal 3/32 to 5/32 in. from each end, with manufacturing tolerance of 0.010 in. Productivity 300 per hour max. with cutting speed of 20 f.p.m.		Finish trepan and drill	8-spindle Fox automatic
Center both ends	Seneca Falls centering machine	Finish drill 17/32 in. hole and finish ream 0.455-0.445 in. hole and square shoulder	8-spindle Fox automatic
Rough turn shaft stem, face tap shoulders, load trays	Special turn mill machines	Note: Drill speed approx. 425 r.p.m., cutting speed 70 f.p.m. with about 0.015 in. feed. Productivity 475 per hour max. with tolerance 0.010 in.	
Note: Metal removed 3/32 to 7/64 in. from diameter with manufacturing tolerance of 0.004 in. Productivity 300 per hour max. with cutting speed of 30 f.p.m.		Mill end of shaft	No. 2 Allen 2-spindle drill press
Rough grind shaft stem	Cincinnati grinder Norton grinder Landis grinder Brown & Sharpe grinder	Burr end of shaft	
Hob 48 serrations on stem end	Barber - Colman hobbing machine	Tap 1/2 in.—20 hole and finish ream 0.747-0.745 counterbore	8-spindle Fox automatic
Rough broach inner and outer diameter	American SB. 42-10 broach machine	Finish grind stem	Cincinnati centerless grinders
Note: Metal removed 1/16 to 3/32 in. from diameter with tolerance of 0.003 in. Productivity 290 per hour max. with cutting speed of 30 f.p.m.		Finish counterbore the 1.0525-1.0515 counterbore	3-spindle Kingsbury Porter cable lathe
Finish grind wing top shoulders	Norton grinders	Finish broach inner and outer diameter	30 in. LaPointe vertical broach
Rough counterbore the wing end	No. 652 New Britain automatic	Note: Material removed 0.012 to 0.015 in. with tolerance of 0.0007 in. Productivity 325 per hour max. with cutting speed of 25 f.p.m. This operation requires use of Sunicut Cutting Oil No. 196.	
Burr shoulders and rough grind bottom	Blanchard grinder	Finish ream cage hole 0.248-0.246	Single spindle drill press
Finish grind bottom	Blanchard grinder	Burnish shaft stem	Waterbury Farrel thread roll machine
Drill all holes and cage hole	Kingsbury drilling machine	General inspection	Tube micrometers
		Wash and truck to assy.	Niagara washer



(Left) One of the new National Acme Gridley machines. These machines are fitted with the Blanchard Pulsator automatic lubrication system

(Below) First operation, broaching both ends of wing for rough length, is handled on the 18 in. American surface broaching machines shown here



comprise the following:

Houdaille shock absorbers.

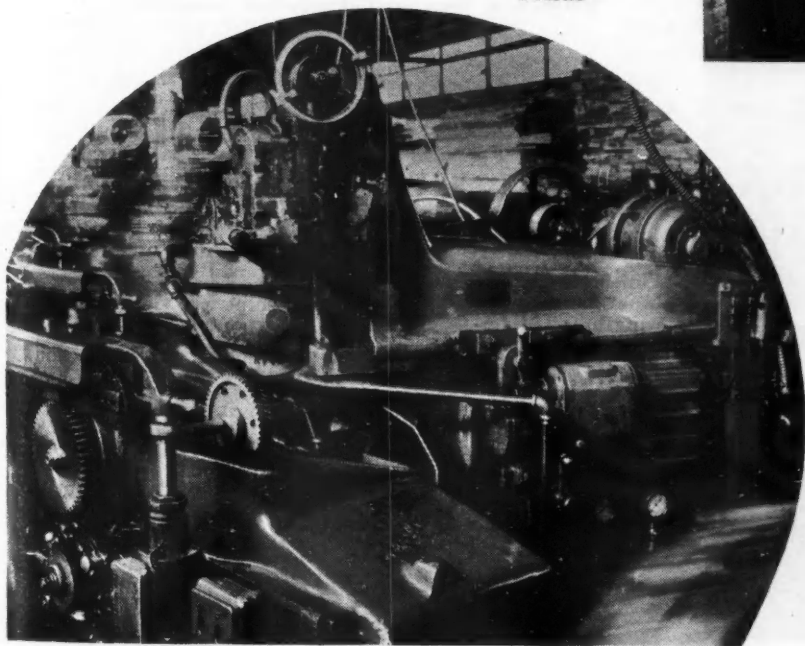
Universal joints ranging in length from 4 in. to 22 in. overall and with corresponding variations in diameter and weight.

Propeller shafts ranging from two to three and a half inches in diameter.

Transmissions from small truck sizes to largest bus and fire truck sizes.

Front axles—the Salisbury line for passenger cars only.

(Below) Close-up of one of the huge battery of Pratt & Whitney gear grinders in Toledo

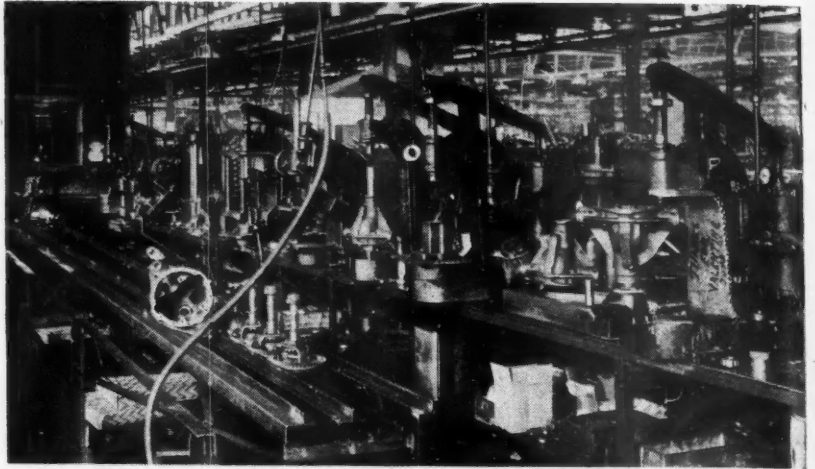


Rear axles, including hypoid gearing, for passenger cars exclusively.

Railway generator drives—a new product.

For practical reasons, the center of interest in this article is the Toledo headquarters factory and, in the main, both the descriptive material and pictorial section feature this plant as the nucleus of activity. However, some mention is made of the other facilities and a part of the pictorial section is devoted to interesting high-spots in the other plants.

General view of compact rear axle assembly department shows the press equipment on bench in the background, for making up sub-assemblies

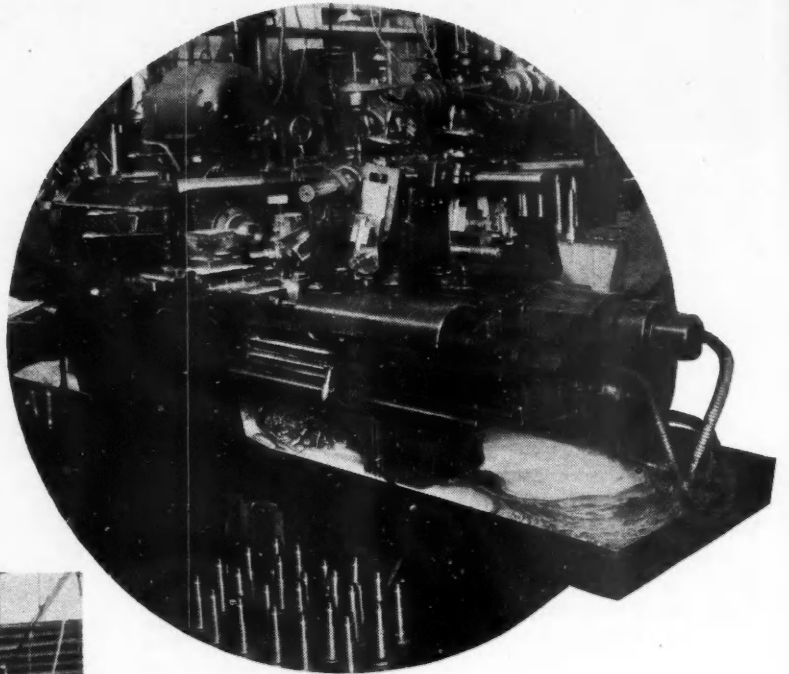


Toledo Plant

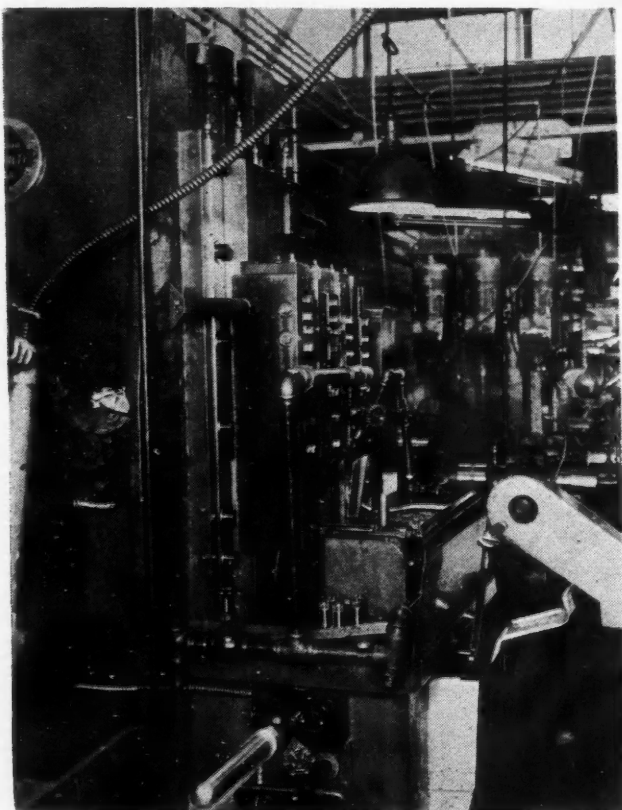
The Toledo factory consists essentially of two separate but adjacent buildings with an enclosed freight spur track in between. The smaller building of the two is concerned exclusively with transmission manufacture, including a very modern gear grinding department housing one of the largest batteries of Pratt & Whitney gear grinders to be found in the industry.

The plant encompasses a floor space of 531,000 sq. ft. and at peak production employs about 2200 people.

So much attention has been attracted in recent months by the opening of new plants of advanced type that it is of more than passing interest to observe that the Spicer Toledo plant was one



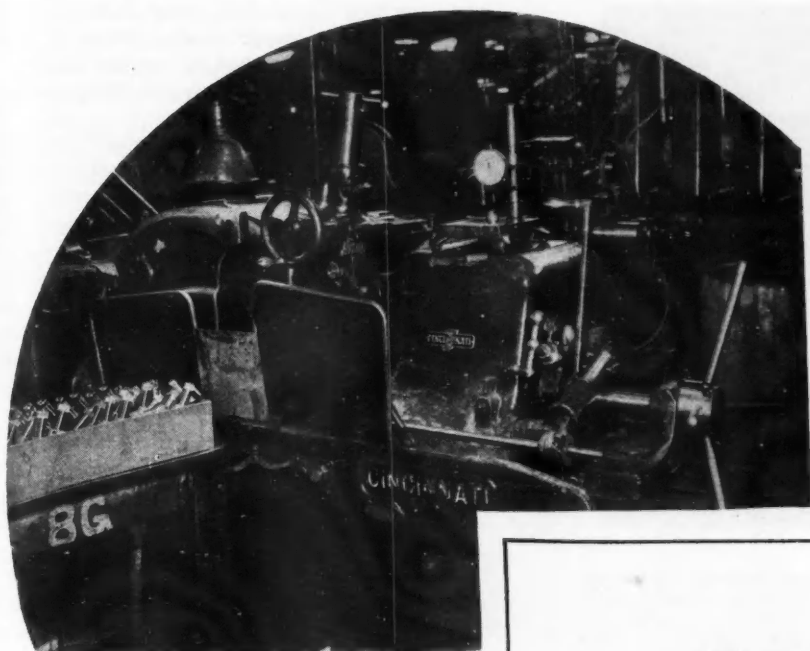
No. 2 Fostermatic tooled up on drive gear—finish-turn bore and finish-face complete



Finish - broaching inner and outer wingshaft diameter on two La Pointe surface broaching machines

of the first in the industry to utilize a single-story building with wide column spacing, accommodating complete manufacturing facilities under a single roof.

From the point of view of layout alone this plant will be found to differ from an automobile plant in many ways. In the first place, each type of product is built in its own self-contained department provided with complete facilities for fabrication and assembly. The only operations excepted from this general practice are those of drop forging and heat treatment, since it is more economical to centralize these operations than to spread them through the different specialized areas.



Part of battery of Cincinnati centerless grinders used to finish-grind wingshaft stem

Thus, in effect, the Spicer plant may be considered as an aggregation of small, self-contained plants arranged in an economical and logical fashion under one roof.

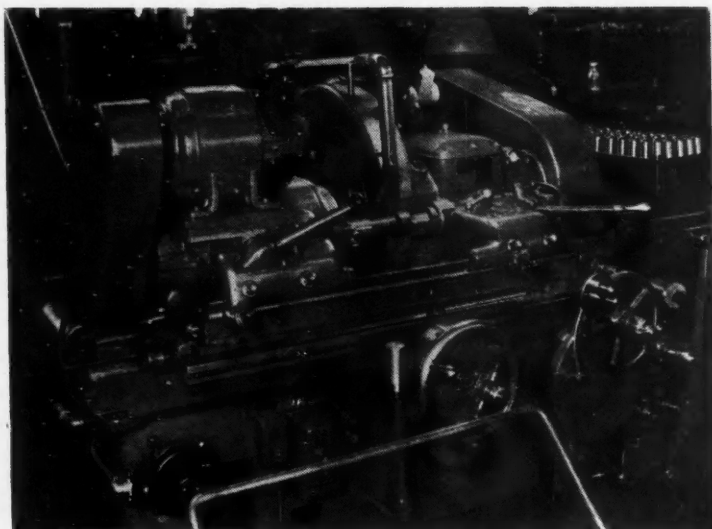
Flexibility is achieved in several ways. In the first place, the general layout of departments is based upon the principle of straight line flow of materials. Raw materials enter the plant at one end and emerge as completed units at the freight spur. Production departments all face in one direction, taking raw materials at one end and moving the machining operations progressively to the assembly lines at the other end.

The second element of flexibility is the use of machine tools with individual drive so that they may be set up at any convenient location. This is facilitated by providing the building with a system of Bull-Dog power ducts which may be plugged in at any point. Thus the shifting and installation of one or more machines is a matter of only a few hours.

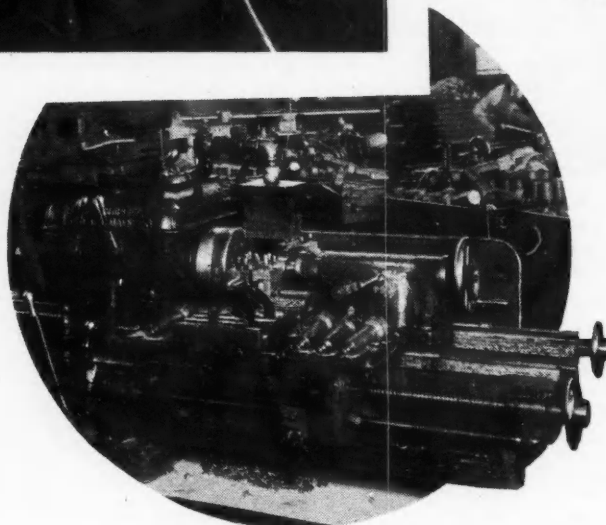
While engineering research goes on unceasingly so that the industry may benefit by the latest developments, it is paralleled by an equipment program which seeks to take advantage of the latest manufacturing techniques. These two objectives moving side by side assure the most favorable costs consistent with high quality levels. During the course of our visit in the Toledo plant we found that many new machines had been installed only a few days previously and also noted many other machines

Factory Routing for Mainshaft

OPERATION	EQUIPMENT
Mill to length $14\frac{1}{32}$ in. (4.010-.000) 10 pieces at a time	Cincinnati 48 in. Duplex mill
Center both ends	Sundstrand centering machine
Finish turn	Lo-Swing lathe
Finish turn	Lo-Swing lathe
Drill $\frac{9}{64}$ in. diameter hole, chamfer and recenter	Henry Wright drill
Thread $1\frac{1}{2}$ — 20 USF 0.9678-0.9660 P.D.	Geometric threading machine
Inspect	
Hob 10 splines (0.214-0.212 x 1.373-1.371)	Barber-Colman hobber
Hob 6 splines (0.401-0.4025 x 1.638 dia.)	Barber-Colman hobber
Hob 22 teeth	Gould & Eberhardt hobber
Mill (0.008-0.012) relief in 6 splines	No. 6 Whitney hand mill
Mill 6 oil grooves	No. 6 Whitney hand mill
Burr complete	
Wire brush	
Wash	Crescent washer
Shave helical spline	National shaving machine
Wash	
Inspect	
Heat treat No. 204	
Inspect	
Lap centers	Canedy-Otto drill press
Straighten	Oilgear press
Grind 1.375-1.374 in. diameter and 1.575-1.5746 in. diameter	Norton external grinder
Grind 1.125-1.124 in. diameter, 1.638 - 1.6375 in. diameter and 1.6855-1.6845 in. diameter	Norton grinder
Grind 2.3830-2.3825 in. diameter	Norton grinder
Inspect	
Lap 22 T. L.H. helix spline	Red Ring lapping machine
Speed for nicks—match and mate	Speeding machine

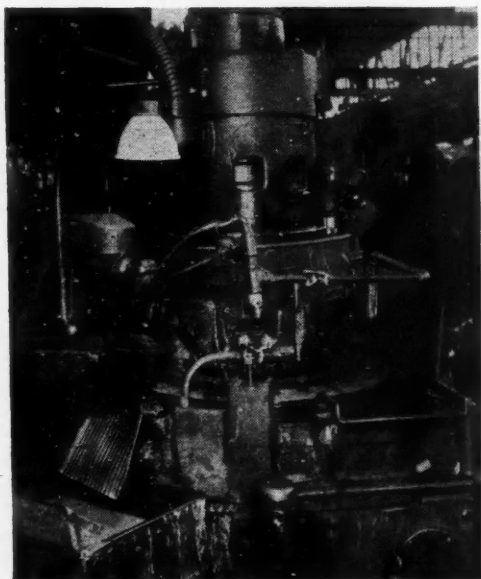


(Above) Stub shaft butt end ground on 10 x 36 Norton plain grinder



(Circle) Butt end of stub shaft is turned on a No. 3 Lodge & Shipley duomatic lathe

(Below) Reservoir liner height is rough-ground to size on this Blanchard surface grinder fitted with a special holding fixture



April 3, 1937

Factory Routing for Front Reservoir

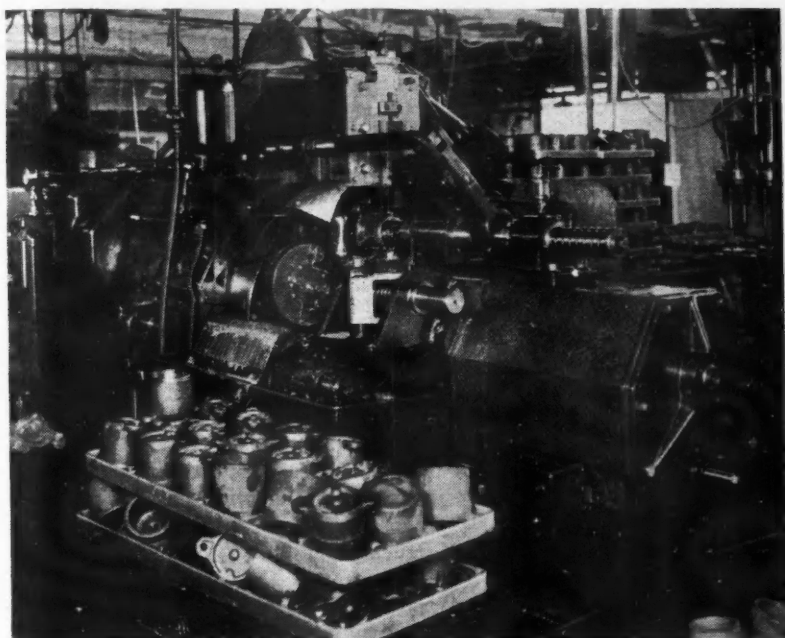
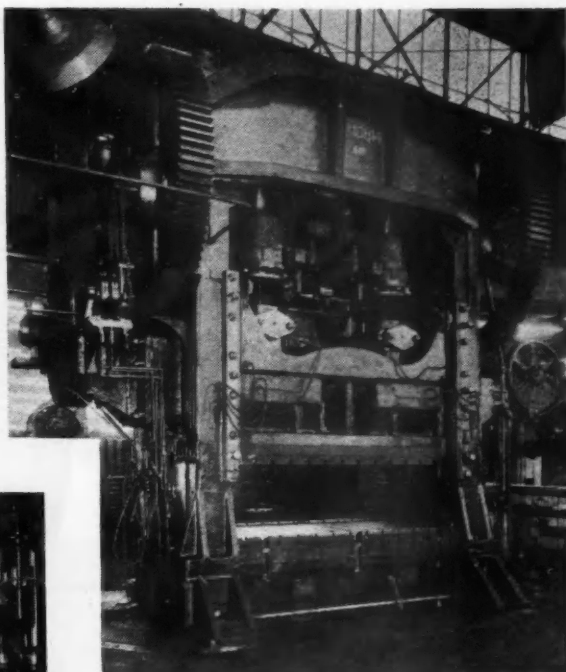
OPERATION	EQUIPMENT
Drill two holes in ears and load trays	No. 2 two spindle Allen drill press
Rough counterbore and finish face, and turn OD	No. 16 New Britain automatics
Broach bottom of reservoir	American 36 in. rotary broach
Drill filler plug hole } Countersink and tap }	Special Feedex unit
Finish counterbore	Sidney lathe
	Fox 4 spindle unit
Cut 2 1/2 in.—20 R.H. thread	Lees Bradner thread mill Hanson - Whitney thread mill
Assemble liners in reservoir	No. 0 Atlas arbor press
Finish ream 1.3755-1.3740 hole in liner. Also blow out	Single spindle drill presses
Burr and blow out also press liner to bottom of reservoir	No. 0 Atlas arbor press
Drill chamfer and ream two dowel holes	Special Feedex unit
Inspect	
Wash and truck to assy.	Niagara washer

Automotive Industries

Spicer was among the very first to install the National Maxipress when the new line of forging equipment was placed on the market. One of the most interesting of its applications is found here in the forging of the differential side gear.

Other examples, to be described more in detail later, include the new Gleason hypoid gear cutting equipment, new Cleveland and Gould & Eberhardt hobs, a new Barber-Colman hobbing machine used for cutting long spiral

This 1000 - ton Hamilton press is used by Parish for forming, blanking, piercing, etc., of side members, X-braces, and the like



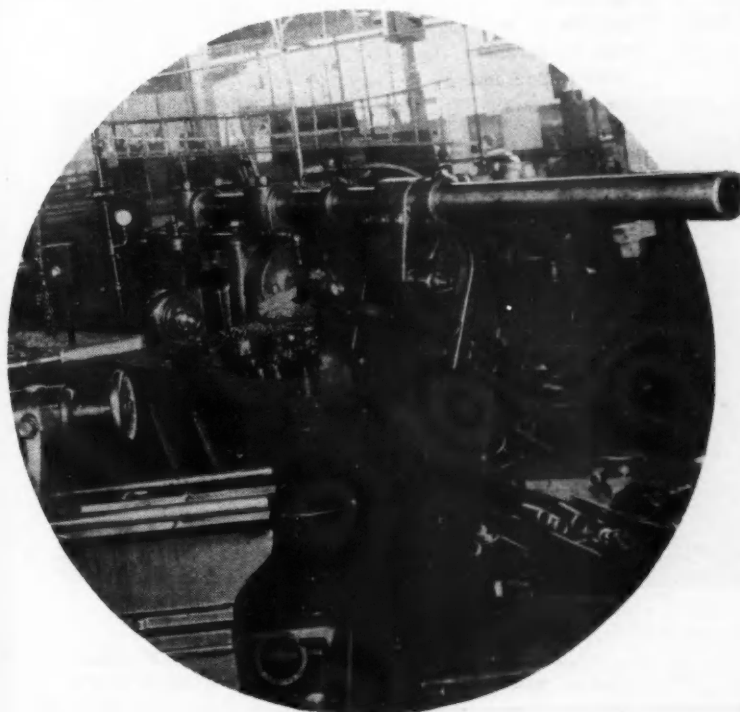
(Left) Front reservoir — rough counterbore, finish-face, and turn O.D., on battery of two New Britain-Gridley automatics

(Below) Stub shafts are cut-off to length on this 3½ in. Bardons & Oliver lathe

splines, and many others. Spicer has just discovered a great utility in the Bardons & Oliver cut-off lathe which they purchased originally for cutting large diameter shaft blanks. It is so fast in action that the job for which it was intended couldn't keep it busy. So they fed it many other cut-off jobs. The upshot of it is that with the installation of several smaller B & O cut-off machines, they will eliminate the cold saw department and yet produce better work in a fraction of the usual time.

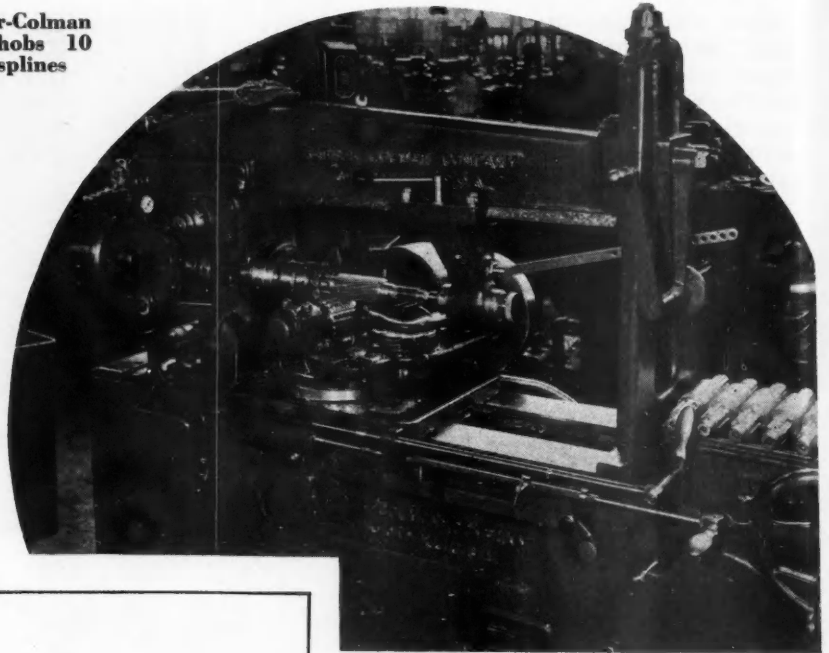
Subsidiary Plants

We mentioned earlier the two subsidiary plants—Spicer at Pottstown, Pa., and Parish at Reading, Pa.



**New Model A Barber-Colman
hobbing machine hobs 10
mainshaft helical splines**

The Pottstown unit specializes largely on high production universal joints and propeller shafts for passenger cars and in this respect differs greatly from the Toledo unit in which these products constitute but one department. The pictorial section has a number of views taken in the Pottstown plant to illustrate the general character of its activity and layout.



Factory Routing for Rear Axle Drive Shaft

OPERATION	EQUIPMENT
Mill to rough length	Davis - Thompson No. 1 Duplex Mill
Center both ends	4 in. x 36 in. Sundstrand double end centering machine
Straighten for turning	20 Ton General Mfg. Co. flexible power press
Rough turn taper; bearing diameter; oil seal; spline diameter; and finish turn thread diameter	Sundstrand center drive lathes
Drill cotter pin hole	14 in. Leland - Gifford single spindle drill press
Countersink cotter pin hole	14 in. Leland - Gifford single spindle drill press
Harden	
Draw	
Tumble to remove scale	
Test for hardness	
Draw thread end	
Clean centers	No. 1 Allen single spindle drill press
Straighten for grinding	No. 203 General Mfg. Co. flexible power press
Grind diameter of spline to size	10 in. x 36 in. Norton grinder
Hob spline	Cleveland Universal rigid hobbers—Model No. 135
Grind oil seal diameter to size	10 in. x 36 in. Norton grinder
Grind taper	10 in. x 36 in. Norton grinder
Face bearing shoulder square to finished length	14 in. x 16 in. Monarch engine lathe
Grind bearing diameter to size	10 in. x 36 in. Norton grinder
Cut thread and leave 0.005 in. for finish cut thread	1½ in. x 1½ in. Landis bolt threader
Mill keyway (4) at a time	No. 1230 Milwaukee simplex mill
Rechase thread and burr keyway	21 in. Cincinnati single spindle drill press
Face spline end to finished length	18 in. Shoemaker & Boye engine lathe

This plant has a floor space of 200,000 sq. ft. and normally employs about 900 people.

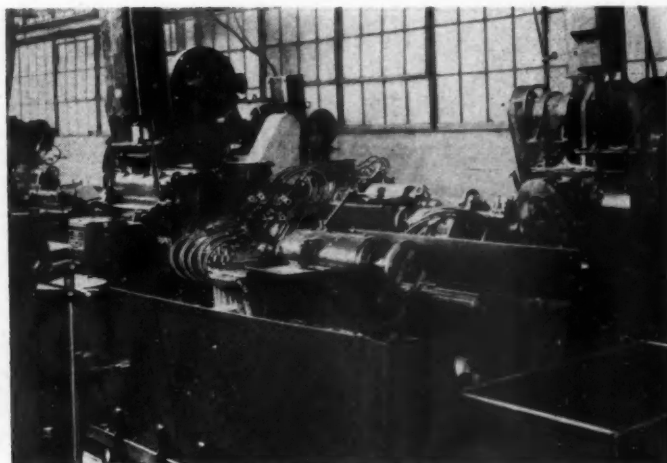
The Parish unit is well known as an important supplier of heat-treated chassis frames for heavy-duty motor trucks and buses. Since the plant is somewhat off the beaten track few people are familiar with the character of the equipment that it employs. Here will be found the longest press beds, the longest heat-treating equipment, and, in fact, the biggest equipment of all types used in frame production due to the length of the side rails required for the large overland buses. Some examples of these unusual presses will be found in the pictorial section.

This plant has a floor space of 190,000 sq. ft. and normally employs about 500 people.

The first step in the production of Parish heat treated frames is a physical and chemical analysis of each lot of steel. Accepted material then is annealed in a special furnace, 40 ft. in length and equipped with pyrometer control. This unit has a capacity of 100 tons in one loading. After annealing, the steel is blanked to form in large capacity presses.

Side rails are formed in a 4000-ton press, 30 ft. long, which is capable of forming cold, in one operation, a channel of ¾ in. stock, 30 ft. in length. Channels 40 to 50 ft. in length can be formed in this press in two operations. Side rails are heat treated and quenched

Fay automatic lathe tooled for complete rough-turning of counter-gear blank

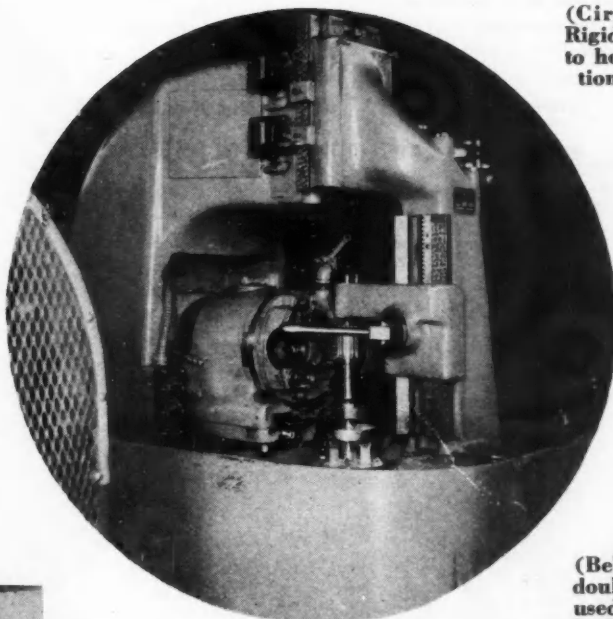


in oil and tempered to the desired hardness, this treatment producing an elastic limit of 60,000 lb. per sq. in. for carbon steel and 90,000 lb. per sq. in. for alloy steel. Uniformity of treatment is assured by a Brinell hardness test of each rail.

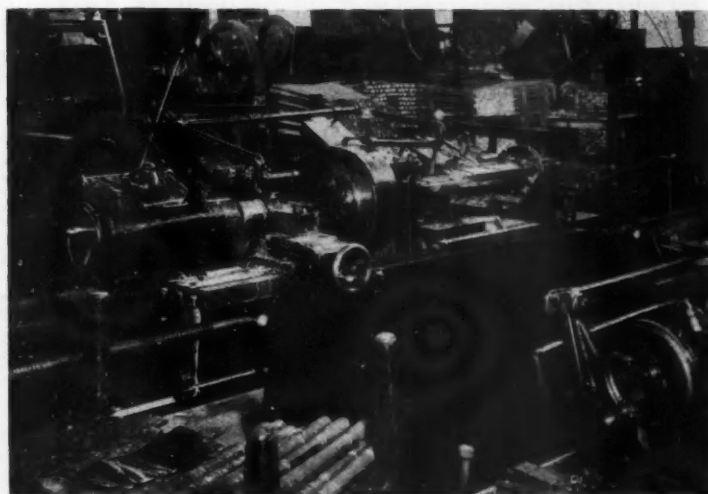
After heat treatment, scale is removed by shotblasting, and the side rails are then straightened to remove twist or warpage. The rails are now ready for drilling and assembly; on large production frames, the holes are pierced in the flat blank and the rails are ready for assembly immediately following heat treat.

Since most commercial chassis are built in a variety of wheelbase lengths, Parish has developed special sectional blanking, piercing, and forming tools which require but a slight change in set-up to accommodate variations in frame length. In this arrangement, the front and rear formed ends are standard sections, variations in length

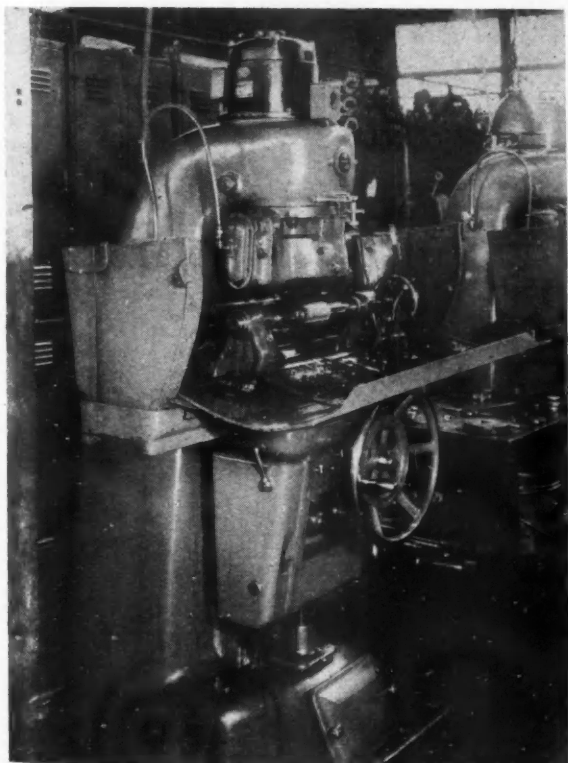
(Circle) Cleveland Rigidhobber is used to hob 16-spline section of stub shaft



(Below) Sundstrand double-end lathe used to rough-turn both ends of rear axle drive shaft



(Left) National Broach shaving machine is used to correct mainshaft helical spline section prior to heat treat



Factory Routing for Stub Shaft

OPERATION	EQUIPMENT
Cut to length	3½ in. Bardons & Oliver cut-off machine
Center both ends	5 ft. Hendy center machine
Turn butt end 2.058-2.063 in., 2.245-2.255 in.	No. 3 Lodge & Shipley duomatic
Turn spline and neck end 1.773-1.778 in., 1.432-1.437 in.	No. 3 Lodge & Shipley duomatic
Heat treat	Surface combustion furnace
Water quench	
Draw	Homo furnace
Pickle for scale removing	
Test for hardness	Rockwell test machine
Recenter	Allen drill press
Straighten	Ferracute press
Grind butt end 2.033-2.038 in.	10 in. x 36 in. Norton plain grinder
Grind neck diameter 1.407-1.412 in.	10 in. x 36 in. Norton plain grinder
Grind spline diameter 1.747-1.748 in.	10 in. x 24 in. type BA Norton grinder
Hob 16 splines	Cleveland rigid hobber
Inspection	

Salisbury Axles for passenger cars
Front
Rear
Bus and Truck Transmissions
Railway Generator Drives

Shock Absorbers

From the standpoint of mass production, the most interesting department in Toledo is the one producing Houdaille shock absorbers, since it represents a set-up capable of building 8000 units a day. To conserve space we shall consider only the major elements of the unit—wingshaft, liner, and reservoir. The complete routing of the wingshaft is described here, while the other two elements are covered by means of the routing table.

The liner is a particularly difficult piece to machine because of the slenderness of wall sections as compared with the diameter. However, the present set-up with broaching in two operations on horizontal Oilgear broaching machines has worked out most satisfactorily.

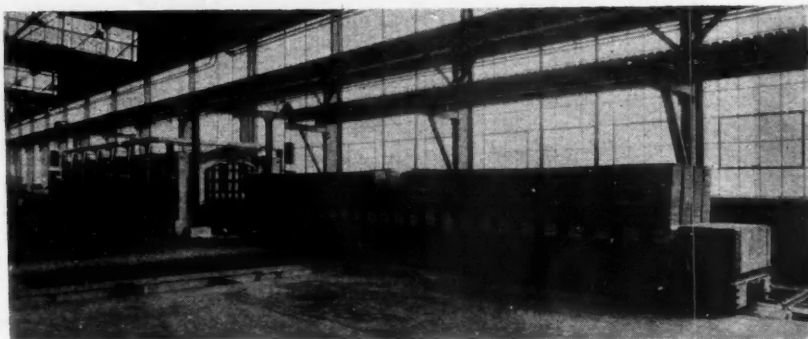
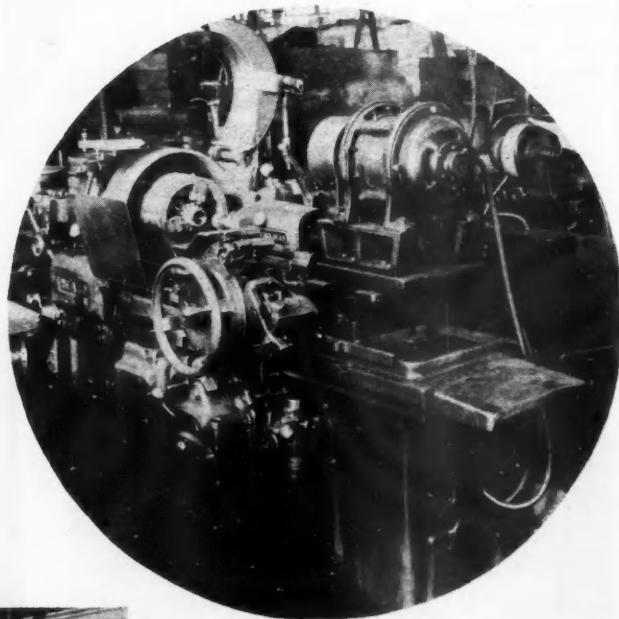
being taken care of by varying the center section.

Toledo Departments

The following distinct departments will be found in the Toledo unit—

Forge Shop
Heat Treat
Shock Absorber
Universal Joint
Joint Assembly

Counter-gear bore is ground on No. 72A3 Heald Sizing grinder to limits of 2.0937-2.0932 in.

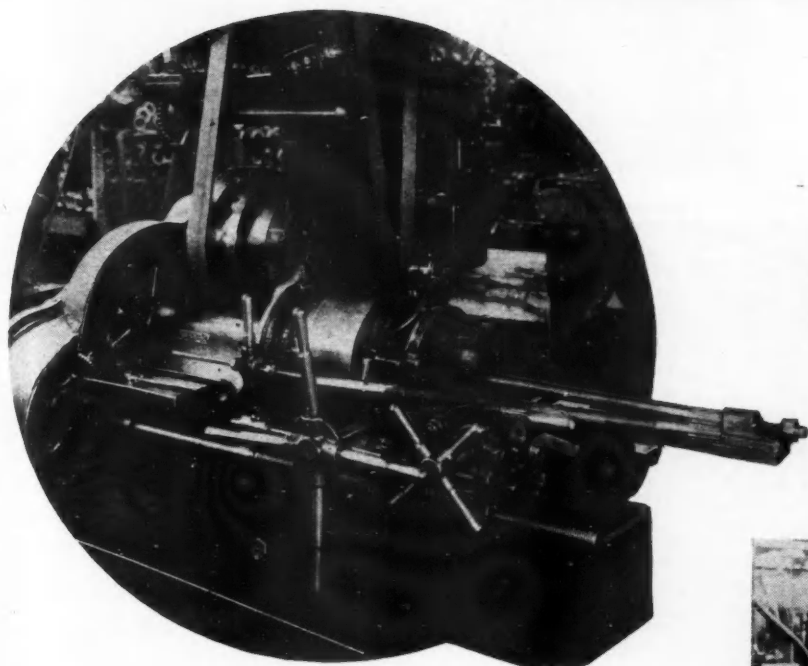


(Left) Inspected strip stock is fed to this 40-ft. annealing furnace. This Parish equipment has a capacity of 100 tons of steel in one setting

April 3, 1937

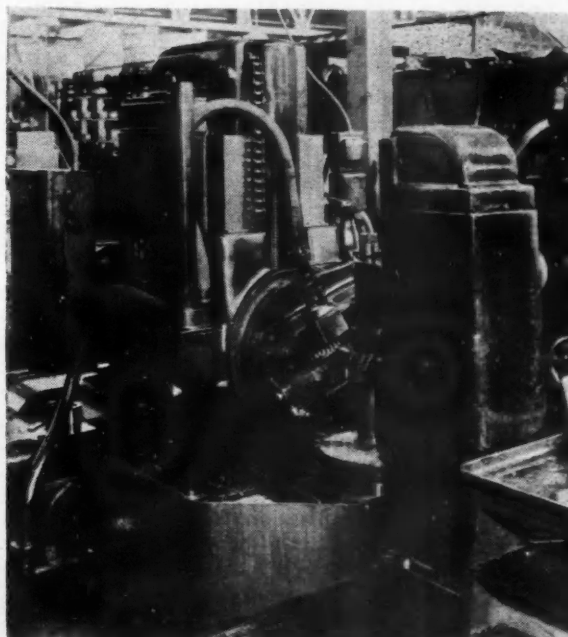
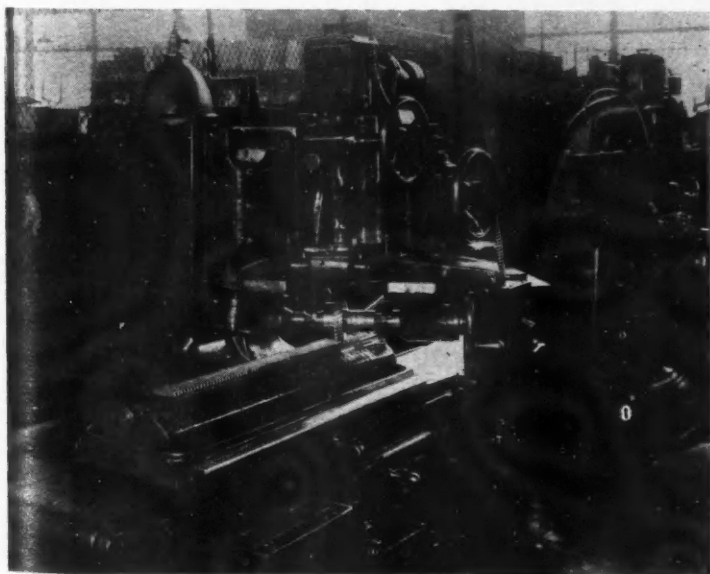
Automotive Industries

(Right) Preliminary turning operations on transmission mainshaft are handled by this Model U Lo-Swing lathe



(Circle) Threading axle drive shaft on this $1\frac{1}{4} \times 1\frac{1}{2}$ Landis bolt threading machine

(Below) Michigan gear shaver corrects helical gear teeth after hobbing and prior to heat treat



(Above) Counter-gear helical gear teeth are finish-hobbed on Gould & Eberhardt hobber

The wingshaft is so thoroughly mechanized that we have found it desirable to discuss the routing in some detail. In the accompanying routing note particularly the use of special techniques including surface broaching wherever feasible, and the turnmilling procedure.

The front reservoir has some interesting features in its set-up. First is the battery of New Britain Gridley automatics recently installed in this department. Next is the use of an unusual machine—the American Rotary Broach for finishing the bottom face. The part is made from a malleable iron casting and metal removal is fairly heavy ranging from 1/32 to 1/16 in. with a tolerance of 0.010 in. Productivity is 480 per hour with a cutting speed of 10 f.p.m.

Transmission Department

As mentioned earlier, the entire small building is devoted to transmission production and assembly, although a number of shafts and gears are fabricated in the main building. Among the transmissions built here are some of the most interesting examples found in the industry, particularly the angular drive units designed for rear-driven buses.

In general, the transmission gears are finished by different methods depending upon gear size. Small diameter gears, unless otherwise specified, are finished by shaving in the green to correct profile and thickness, and then lapping after heat treatment. For shaving they have installed both Michigan Tool and National Red Ring gear shaving machines. Finished gears are tested for quietness on Red Ring gear speeders.

All large gears, and this generally includes gears for the entire bus transmission, are finished by precision grinding after heat treat. For this purpose, Spicer operates what is probably the largest commercial gear grinding department in the industry equipped with Pratt & Whitney universal gear grinders applicable for spur and helical gears.

To illustrate the application of gear shapers, hobbbers, and new types of spline cutting machines in use here, we have selected factory routings on the following typical parts—1st speed countershaft gear, drive gear, and mainshaft. These are reproduced elsewhere in the article.

On universal joint production we have selected the routing of the stub shaft to illustrate the process. This set-up features the Bardons & Oliver cut-off lathe mentioned earlier, a battery of new No. 3 Lodge & Shipley Duomatics, and a battery of Cleveland

Rigidhobbers used for cutting the 16-spline section. Work supplied to these machines has a hardness of R_c 40-46.

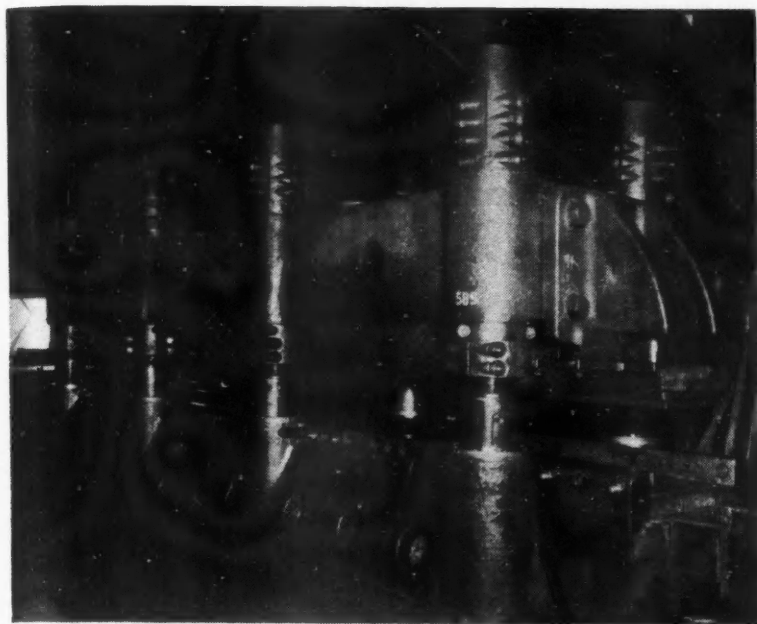
Rear Axle

It is probably a matter of common knowledge that Spicer is the oldest producer, in the industry, of hypoid rear

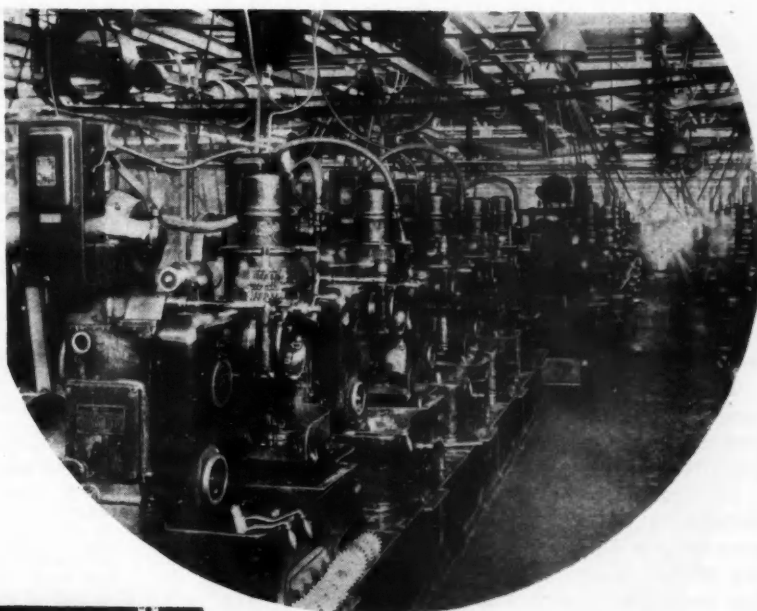
axles, having built this type of gearing for over 10 years dating back to the time when suitable gear cutting equipment was not yet commercially available. They have used conventional Gleason gear cutters for some years, but this season when the new type Gleason hypoid machines became gen-

Factory Routing for Drive Gear

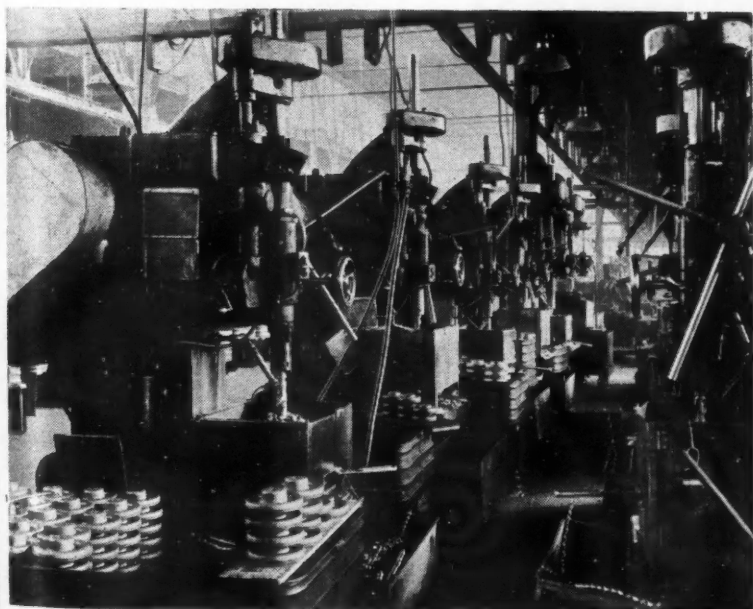
OPERATION	EQUIPMENT
Mill to length 8 1/2 in. (+0.010 -0.000)	Cincinnati duplex mill 48 in.
Center both ends	Sundstrand centering machine
Rough turn 1 in. thread diameter	Lo-Swing lathe
Finish turn 0.995/0.992 in. thread diameter	Lo-Swing lathe
Drill 9/64 in. diameter pin hole chamfer. Recenter both ends	Henry Wright drill
Grind 1.373-1.371 in. diameter, 1.140-1.141 in. diameter	Norton grinder 10 x 24
Finish turn 1.7545-1.7535 in. diameter and 1.5195 in.	Lo-Swing lathe
Finish turn bore 1.610-1.612 in. diameter finish face complete	No. 2 Fostermatic
Drill 3 oil holes 3/16 in. diameter	Edlund drill press
Thread 1 in.—20 USF thread 0.9678-0.9660	Geometric threading machine
Burr complete	
Grind 1.787-1.7865 in. diameter, stem diameter 1.5145-1.5135 in.	Norton grinder 10 x 24
Inspect	
Rough hob 20 T. 6 pitch 20 deg. involute	Barber-Colman hobber
Finish cut 20 T. 6 pitch 20 deg. involute	No. 61 A Fellows shaper
Hob 10 splines	Gould & Eberhardt hobber
Wash	Crescent washer
Set back 10 teeth alternate 0.072-0.062 deep	Superior drill
Burr	Speed lathe
Wire brush	
File chamfer	
Burnish teeth	Bolender burnisher
Wash	Crescent washer
Inspect	Fellows Red Liner
Speed gear for noise	Gleason speeder
Heat treat No. 200	
Clean center stem end and lap large bore	Allen drill press
Straighten	Straightening press
Grind 1.5025-1.5015 in. diameter, 1.575-1.5746 in. diameter	Norton grinder
Grind 1.7721-1.7717 in. diameter	Norton grinder
Grind 1.627-1.626 in. bore	Heald grinder
Wash	Crescent washer
Inspect	
Lap gear teeth	Red Ring lapping machine



(Above) Parish side rails are formed cold in one operation in this 4000-ton capacity Mesta press. It has a 30-ft. bed and can handle channels 30 ft. in length formed from $\frac{3}{8}$ in. stock



(Right) View of part of battery of Fellows gear shapers in Toledo transmission gear department



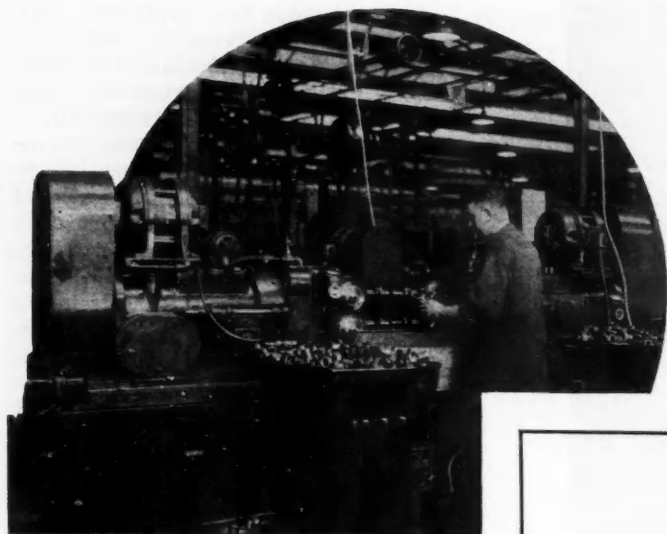
(Left) Battery of heavy-duty, single-spindle Baker drill presses set up to drill $2 \frac{5}{16}$ in. diameter hole in counter-gear for broach pilot

erally available, Spicer installed a battery of six pinion cutters and three ring gear cutters. The latter are capable of finishing a ring gear tooth from the rough blank in just six seconds.

Several years ago, AUTOMOTIVE INDUSTRIES recorded the advent of the patented axle construction developed by Spicer for producing an unusually rigid mounting, preventing flexing under load and consequently reducing or eliminating service adjustments in the field. On the basis of service records, it is claimed that field adjustments have indeed been eliminated since that time.

In this design the usual banjo arms are eliminated, the carrier and differ-

ential being held rigidly in the carrier housing. Primarily this construction depends upon the use of shims rather than screw adjustments. In final assembly of the axle each sub-assembly is made up in a special fixture using gages to determine the exact thickness of shim required. These fixtures check the carrier for cone center distance, for side-play, back-lash, etc., and then a



Fox special machine designed for gashing ring grooves in universal joint yokes at Pottstown

special master fixture is used for the complete assembly in the housing. After assembly the axle tubes are pressed into the housing on Lucas presses and arc-welded in place through counter-sunk holes at each end.

This construction is standard Spicer practice today and has been incorporated in the manufacture of the hypoid rear ends now in production.

To illustrate one of the latest developments in the axle division, we have shown the complete routing of the Model 41 axle drive shaft which has been tooled with many items of new equipment. Note for example, the battery of Sundstrand double-end and center-drive lathes, and the Cleveland Rigidhobbers, the latter being used to hob the spline ends.

General Notes

It is a characteristic of progressive manufacturing organizations that much effort is being constantly expended upon the study of tools, tool materials, cutting fluids, and the like.

Spicer has a very definite and conscious equipment program, as noted earlier, based upon an appreciation of new developments as well as the realities of their own specific problems. The most important principle to be observed here is that the type of equipment used depends entirely upon the nature of its work and the productivity involved in a specific operation. In an operation such as this, there is room

for practically all of the varieties of equipment known to the production specialist — single-purpose, unit-type, universal machines, and tool room machines. And examples of all types will be found here.

Materials handling also is a problem of productivity. Conveyors are used only where justified by conditions as in the case of the shock absorber department where the whole unit is mech-

Factory Routing for Gear 1st Speed Countershaft

OPERATION	EQUIPMENT
Drill 2 5/16 in. diameter hole for broach pilot	Baker drill press
Broach 2.376-2.375 in. diameter hole with 3 projections 0.120-0.130 wide x 0.005-0.006 in. high	LaPointe broach machine
Size broach 2.376-2.375 in. diameter hole 3 projections 0.120-0.130 in. wide x 0.005-0.006 in. high	Niles push broach machine
Face small diameter side of hub and chamfer 1/64 in. x 45 deg.	American lathe
Rough turn and straddle face	Fay automatic lathe
Finish turn and straddle face	Fay automatic lathe
Drill three holes 5/8 in. diameter and burr	Natco multiple spindle drill press
Drill three holes 1/4 in. diameter equally spaced and burr	Superior drill press
Burr drilled holes	
Mill 4 oil grooves 1/8 in. wide x 1/16 in. deep	Whitney hand mill
Burr and wire brush	
Inspect	
Shape clutch teeth 18 T. 6-8 P. except add. and ded. 20 deg. involute. To measure 3.571-3.568 over 0.345 diameter pins.	Fellows gear shaper
Hob helical gear 35 T.	Gould & Eberhardt hobbing machine
Point clutch	
Chamfer acute angle of gear teeth 0.030 to 0.040 in. X 30 deg.	National chamfering machine
Wash	Niagara washer
Burr and stamp	
Shave gear teeth 35 T 7 N.P.	Michigan Tool Co. gear shaver
Wash	Niagara washer
Inspect	Red Liner
Heat treat No. 200	
Inspect	
Press in bushing	Fox geared press
Drill 3 holes 1/4 in. diameter @ 30 degree angle	Edlund single spindle drill press
Burr 3/4 in. diameter holes	Edlund single spindle drill
Grind bore 2.0937-2.0932 diameter	No. 72 A 3 Heald Size-matic
Grind both faces to 1.994-1.992 dimension	Heald rotary surface grinder
Wash part	Crescent washer
Inspect	
Match and mate and speed gear	
Stores	Landis speeder

Factory Routing for Reservoir Liner Front and Rear Shock

OPERATION	EQUIPMENT
Rough grind thickness 1.259-1.262	Blanchard grinder
Burr	
Rough broach the I.D. and semi-finish the inner diameter	Oilgear broach machine (horizontal)
Rough turn O.D.	Lathes { 1-9 in. Reed Prentice 1-9 in. Monarch 1-9 in. LeBlond
Finish broach I.D. and semi-finish inner small hole	Oilgear broach machine (horizontal)
Sand burrs and finish grind thickness size 1.2505-1.250 in.	Blanchard grinder
Semi-finish and finish, finish-turn O.D. and chamfer	Porter-Cable lathes
Cut breather grooves in one side of liner and burr complete	

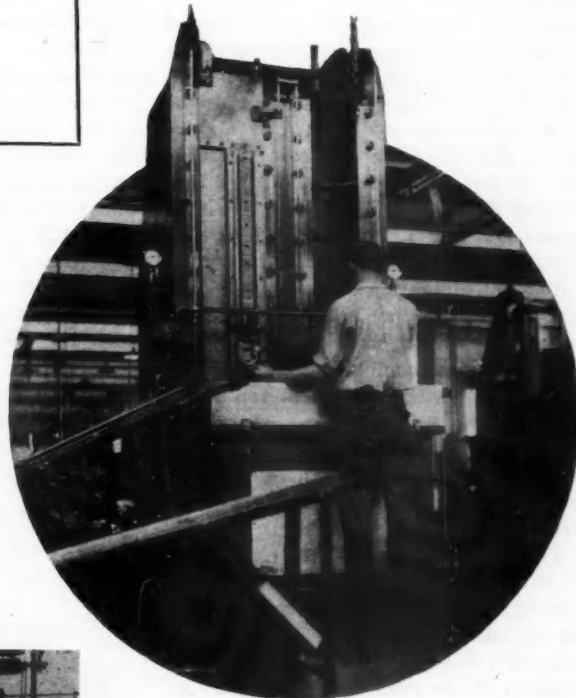
since most of the component parts are held to close tolerances while complete assemblies such as the shock absorber, rear axle, transmission, etc., require accurate control to conform to customers' specifications.

Tool materials are subject to close study to determine the type or types most adaptable and most economical in this operation. The jobbing type of production is rather more exacting in this respect than is mass production because tool cost is an appreciable item of expense in limited or job lots. The company has done some work recently with a new type of high-speed-steel which has shown great promise on a number of set-ups. However, the work has not progressed sufficiently to warrant complete disclosure at this writing.

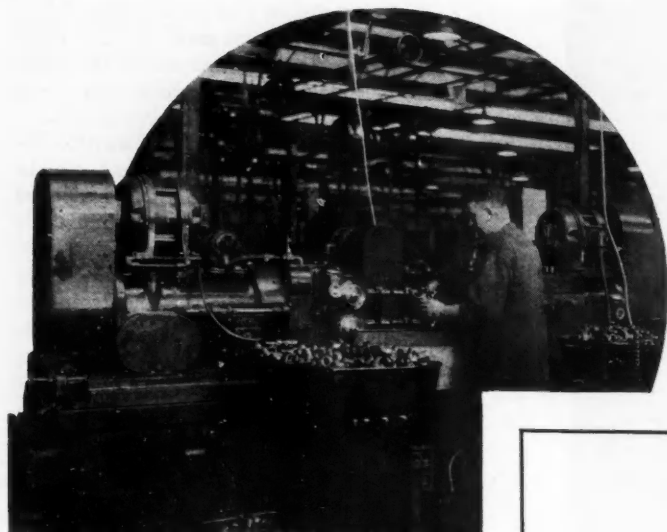
anized, using overhead conveyor chains, belt-type assembly conveyor, and automatic magazine feed for the turn-milling machines. Recently, as production volume warranted it, they have installed overhead conveyor lines for handling hypoid ring gears and pinion shafts through the heat treat.

Quality control, obviously, is an important part of the overall program

(Circle) LaPointe Duplex surface broaching machine is used at the Pottstown plant for broaching heavy yokes



(Left) Battery of Heald internal centerless grinders at Pottstown handle the internal grinding of bearing races



Fox special machine designed for gashing ring grooves in universal joint yokes at Pottstown

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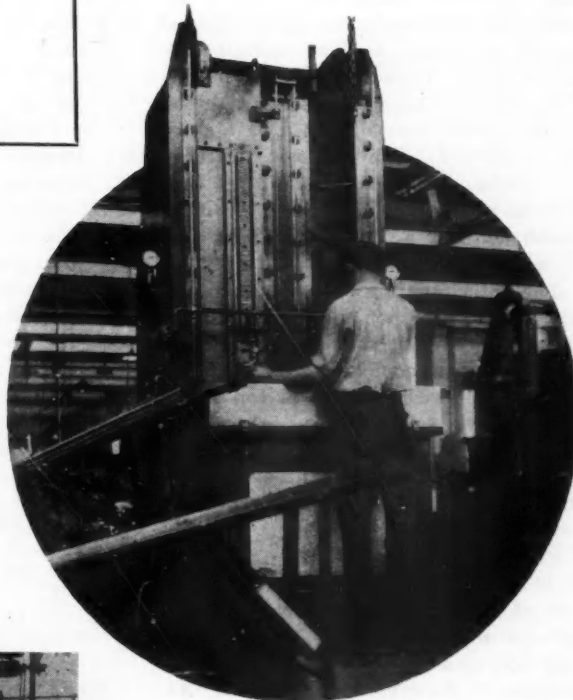
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(Left) Battery of Heald internal centerless grinders at Pottstown handle the internal grinding of bearing races

Effect of Spark Advance on Combustion Pressure

By L. C. Lichty¹

THE combustion process in the internal combustion engine requires an appreciable amount of time, so that the constant-volume process $A-B$ of the ideal card (Fig. 1) is not attained. If possible of attainment this process would result in "maximum power and maximum fuel economy," as stated by Mr. Heldt². If ignition occurred on dead center the path followed would be similar to that indicated by AID , which crosses the expansion line (BL) of the ideal card. Advancing the time of ignition results in a path similar to $EFGH$. The expansion line for this timing lies between the other two instead of all coinciding with the ideal expansion line as indicated in article to which reference is made.

The determination of optimum spark advance depends not only upon the loss of work area, but also upon the gain of work area as compared with the ideal card. Thus with ignition at top dead-center work area $ABIA$ is lost, but work area $IDJLI$ is gained. Similarly, for ignition at E , work areas $AFEA$ and $FBGH$ are lost, while work area $GHKLG$ is gained.

The proof that line AID crosses line $BGICL$ is based upon the Energy Equation of Thermodynamics. At point A the mixture has the same Internal Energy (E) and Chemical Energy (C) regardless of the cycle to be followed. At B most of the chemical energy has been liberated and the mixture is assumed to be in chemical equilibrium during the expansion process B to L . Since AB is a constant volume process, no work is done. However, from B to I work is done by the gases which is equivalent to the total area ($B'BII'$) under the path BI . Following the path AI , the work done is appreciably less and consequently the total Energy in the gases at I must be greater following this path, for

$$\text{Energy at } I = E_A + C_A - \text{Area } (B'BII') \quad (\text{Path } ABI)$$

$$\text{Also, Energy at } I = E_A + C_A - \text{Area } (B'AII') \quad (\text{Path } AI)$$

$$\text{Since, Area } (B'BII') > \text{Area } (B'AII') \\ (E_I + C_I)_{\text{Path } AI} > (E_I + C_I)_{\text{Path } ABI}$$

The Internal Energy (E) at I is practically the same regardless of the path and would be the same if mixture constituents at I were the same by both paths. Hence, following path AI there must be appreciably more Chemical Energy (C) at I , most of which is liberated from I to D , causing the path AI to cross $BGICL$ and result in an expansion line above that of the ideal card.

Similarly, it can be shown that with ignition at E the expansion line will lie between the other two lines.

The foregoing proof is based upon the assumption of no Heat loss from the gases to the walls. If Heat loss is taken into account it is obvious that path ABI would result in more Heat loss than path AI . This would make the difference of the Energies at I by the two paths still greater and with the path AI resulting in the greater Energy at I .

Another method of studying the effect of combustion time and spark timing on engine efficiency, proposed by Marvin³, and used by Streeter and

Lichty⁴, is based upon the principle that the efficiency of transformation of Energy into Work in an engine depends upon the expansion ratio possible when the given energy is liberated by the combustion process. Thus any Energy liberated either before or after dead center has less expansion ratio than if liberated at dead center, and consequently less efficiency of transformation into Work. Both of the methods, by Heldt and Marvin, require a knowledge of the rate of Energy liberation with the different spark timings to determine optimum spark setting.

While I was aware of the fact that a change in the ignition timing will have some effect on the latter part of the expansion line, I regarded it as of insufficient importance to require taking into account in connection with the matter under discussion. This, of course, is a matter of opinion. The effect of changes in the expansion line can easily be taken into account by a slight change in the wording of the rule for the optimum ignition timing. Instead of saying this is such that the additional loss during the latter part of the compression stroke caused by a very slight increase in the ignition advance is exactly equalled by the gain during the early part of the expansion stroke, we might say that the optimum timing is such that gains resulting from any slight increase in the ignition advance, at one or more points of the cycle, are exactly balanced by losses at other points.—P.M.H.

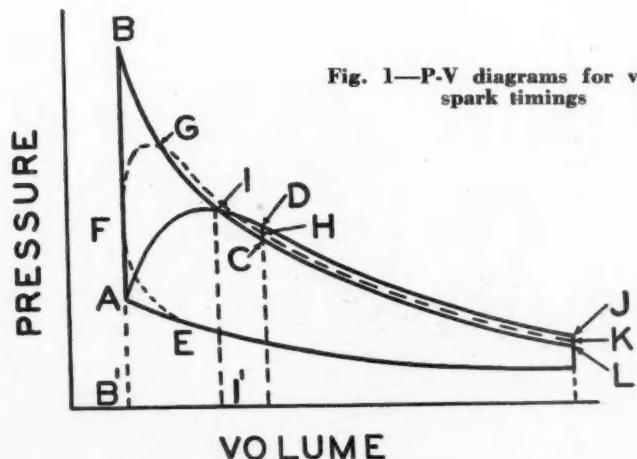
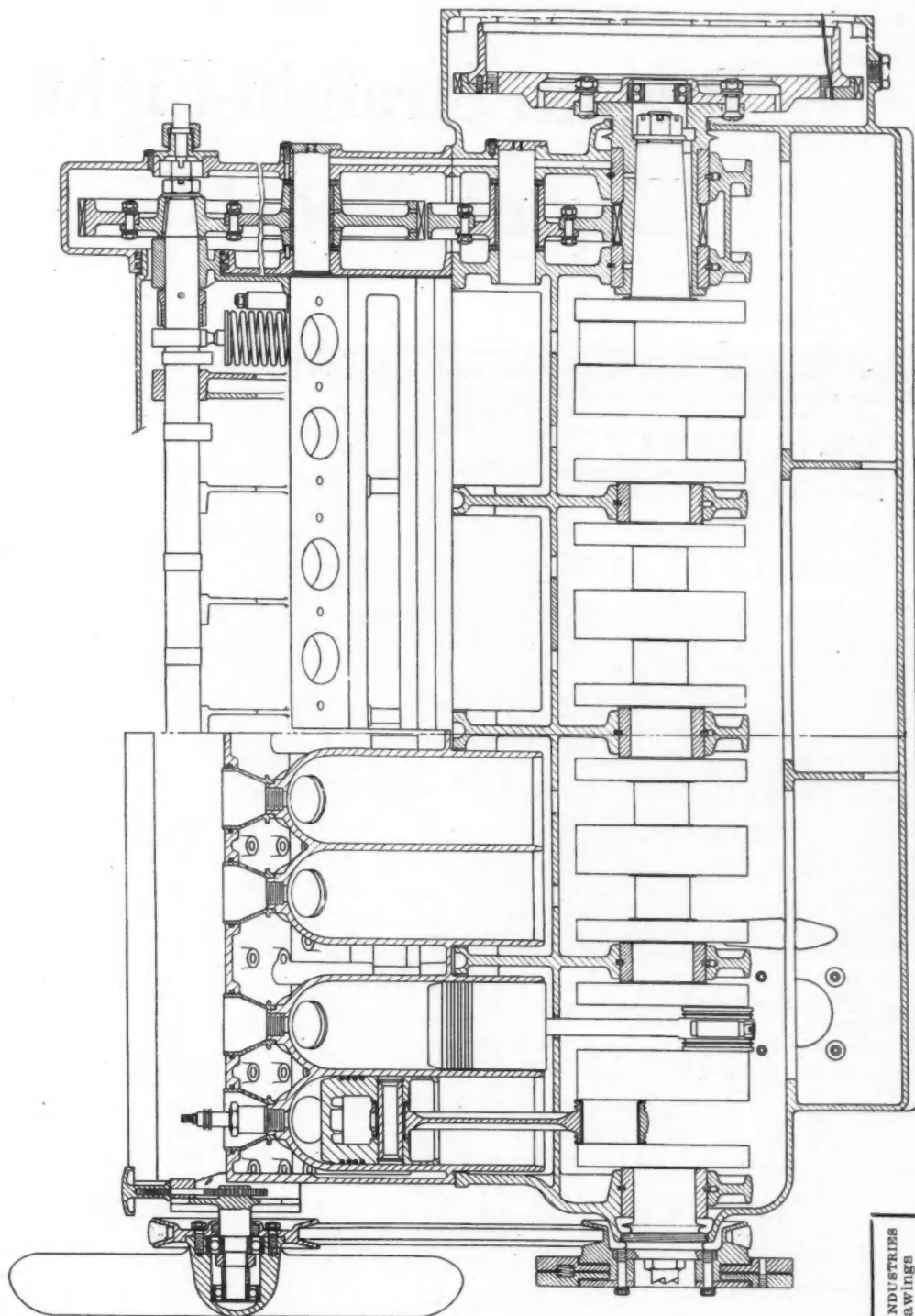


Fig. 1—P-V diagrams for various spark timings

Bugatti Straight-Eight Engine, Model 57

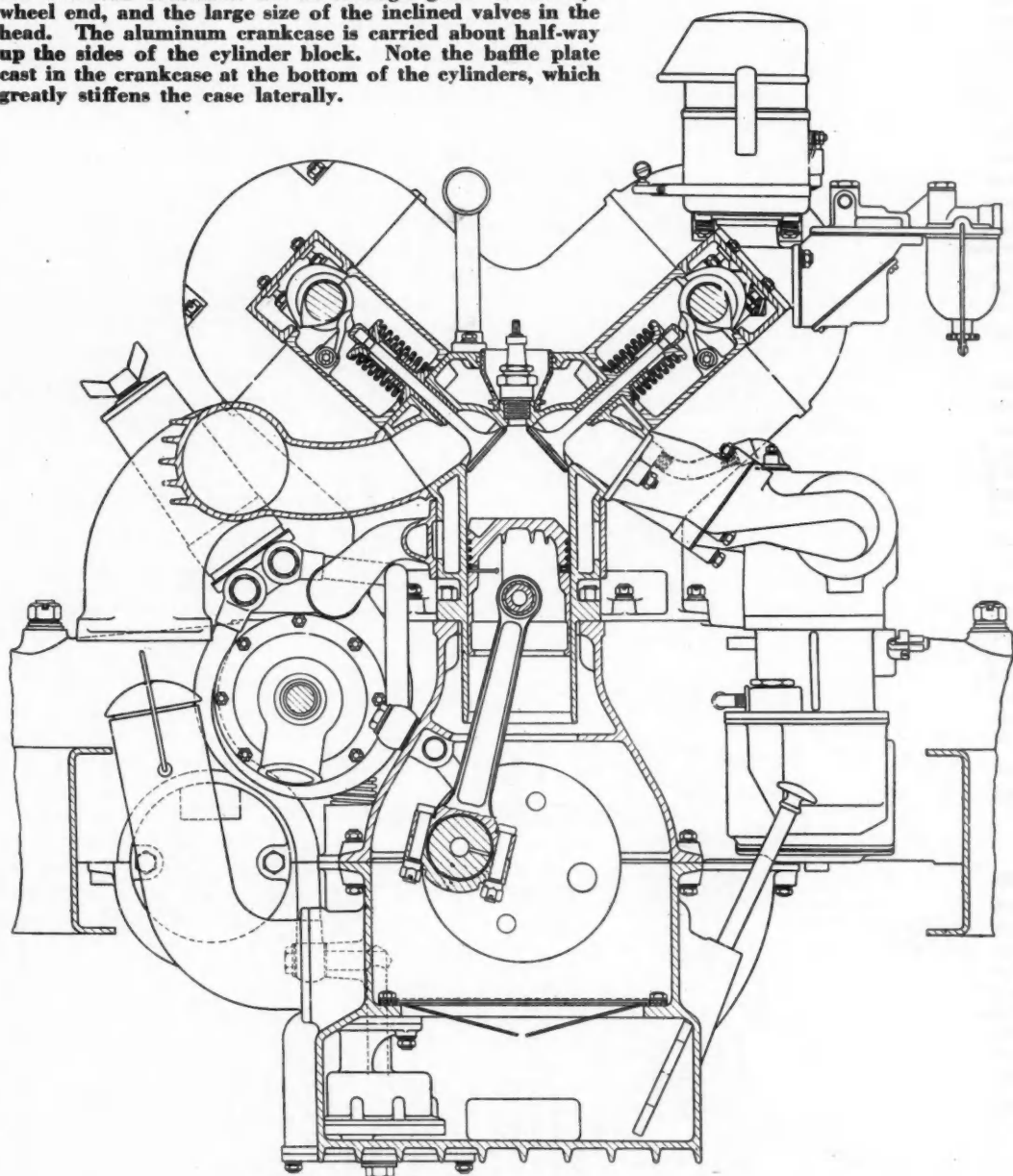


This engine, which is outstanding by reason of its high specific output, has a bore of 72 mm. (2.83 in.) and a stroke of 100 mm. (3.94 in.). Its displacement is 198.7 cu. in. and it is rated 140 hp. at 4600 r.p.m. with a compression ratio of 6:1. The maximum torque of the engine is 25 m.-kg. or 180 lb.-ft. The b.m.e.p. at maximum output figures out to 112.5 lb. per sq. in. Pistons are cast of the RR 53 aluminum alloy.

No. 19 in the AUTOMOTIVE INDUSTRIES Series of Engineering Drawings

Bugatti Straight-Eight Engine, Model 57

Among the unusual features of this engine are the crankshaft with circular webs instead of the usual crank arms, the overhead camshafts driven through gears at the fly-wheel end, and the large size of the inclined valves in the head. The aluminum crankcase is carried about half-way up the sides of the cylinder block. Note the baffle plate cast in the crankcase at the bottom of the cylinders, which greatly stiffens the case laterally.



Car Ownership Shown

Commerce Survey Finds 50% of Automobiles Owned by Low-Income Families

More than 50 per cent of all automobiles in use in a cross-country group of nine cities and considerably more than 50 per cent of all reported mechanical refrigerators in these cities were found to be in the possession of families reporting incomes between \$1,000 and \$3,000, according to a consumer-market study released by the Bureau of Foreign and Domestic Commerce, Department of Commerce.

This study bears directly upon characteristic differences in living standards among the various income classes and reveals a vast array of factual data for the use of business organizations in better covering and better serving the consumer market.

These statistics, gathered in 1934 from families giving information concerning their use of certain "durable goods" items and the amount of the family income for the preceding year, cover about 12 per cent of the entire family population of Portland, Ore.; Casper, Wyo.; Oklahoma City, Okla.; Paducah, Ky.; Frederick, Md.; Des Moines, Iowa; Lansing, Mich.; Erie, Pa., and Burlington, Vt.

On the basis of number of consumers of these products, including certain conveniences often referred to as luxuries, the upper income classes are shown to be of relatively small importance, since, with a fair representation from all sections within each city, less than 1.5 per cent of the reporting families from the entire group of cities had, on the date of survey, incomes above \$7,000 for the year and only about 6 per cent of all reporting white families had incomes of \$3,000 or in excess of that amount.

The importance of the lower income groups as consumers, despite the fact that many low-income families reported the absence of modern equipment, is further explained by figures revealing that in these cities considerably more than three times as many families reported incomes between \$1,000 and \$2,000 as there are families claiming incomes between \$2,000 and \$3,000.

Ancient Chinese Castings In Foundrymen's Exhibit

Through courtesy of Thomas T. Read, School of Mines, Columbia University, New York, a special arrangement of ancient Chinese castings has been obtained for the American Foundrymen's Association's convention in Milwaukee, May 3 to 7. These castings, the largest of which is about 30 in. high, are authentic iron castings made in China in various years from 458 A.D. to 1093 A.D. Having arrived recently in the United States, they will

be shown for the first time at the foundrymen's convention.

Ford Enlarges His First "Village Industry" Plant

A new, modern one-story valve manufacturing plant employing 400 workers and set in a charming garden spot in the small village of Northville, 30 mi. from the great Ford Rouge plant at Dearborn, Mich., has just replaced Henry Ford's first "village" factory.

It was 16 years ago that Henry Ford began to put into practice his conception of the need for a closer alliance

between the farm and factory, which would move industry back from the crowded cities into the country, alongside the farm. The Northville valve plant, located in an abandoned village factory, was the result. Today the first of the "village industries" has outgrown its swaddling clothes. In its 16 years of operation, the original Northville plant produced more than 181,000,000 valves—68,000,000 for V-8 type motors alone.

The new plant, air-conditioned and equipped with the most modern machinery, has 30,640 sq. ft. of floor space compared with 24,240 sq. ft. in the old building.



"Don't Wait! Buy the steel from Ryerson and it will be here in the morning"

Hot Rolled Alloys
 S.A.E. 2315, 2320, 2330, 2335, 2340, 2345, 2350, 3115, 3120, 3130, 3135, 3140, 3250, 4140, etc.
 Rycase (hot rolled, machine straightened).
 Rytense A.A. (hot rolled, machine straightened).

Cold Drawn Alloys
 S.A.E. 2315, 2320, 2330, 3115, 3120, 3135, etc.

Heat Treated Alloys
 Rycro (hot rolled, machine straightened).
 Nikrome (hot rolled, cold drawn, machine straightened).

Stainless and Heat Resisting Alloys
 Allegheny Metal (Sheets, Bars, Welding Rod, etc.).

Cold Finished Steels
 Std. Shafting. Turned Ground and Polished Special Accuracy Stock, Rycase High Manganese Screw Stock, S.A.E. 1020, 1035, 1112, 1120, etc.

Tool Steels
 Ryerson B.F.D. Die Steel.
 Ryerson "Shock" Steel.
 Ryerson V.D. Steel.

General Steel Products
 All steel products such as Bars, Structural, Plates, Sheets, Strip Steel, Welding Rod, Tubes, etc.

When steel must be on hand at a certain time to maintain an uninterrupted schedule and you can't afford to take chances on delivery—when something breaks or specifications change—'phone, wire or write the nearest Ryerson plant. The steel is in stock—every shape, size and kind—Immediate Shipment is assured.

There are ten Ryerson plants ready to serve you. Each plant is strategically located for quick, economical distribution of steel throughout its own industrial area. In every plant there is a strong experienced organization and complete facilities for cutting, bending or forming the material to your specifications. Draw on the Plant Nearest You.

Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, St. Louis, Cleveland, Cincinnati, Detroit, Boston, Buffalo, Philadelphia, Jersey City

RYERSON

Finance Cos. Submit Stipulations

*Federal Trade Commission Studies Proposals to End
"6% Plan" Unfair Advertising Cases*

Settlement of the so-called "six per cent" automobile sales financing cases before the Federal Trade Commission is understood to be near at hand. As indicated by AUTOMOTIVE INDUSTRIES, issue of March 20, it is expected that these cases will be brought to an end through stipulations.

Since that time a number of automobile manufacturers and financing companies have submitted stipulations

to the commission and it is believed that they will be accepted at an early date. The stipulations are understood to follow the lines of those entered into between the Studebaker Corp. and its subsidiary, the Studebaker Sales Corp. of America, with the Federal Trade Commission.

The Studebaker Corp. and the commission agreed upon the stipulations prior to the issuance by the commission

of a complaint which named 21 respondents and charged that the so-called six per cent time-payment plan was misleading to buyers of automobiles. The commission contended that the financing plan actually involves a six per cent rate charged on the full amount of the account from the date it is started, regardless of the fact that the account is amortized in equal monthly payments.

The pending complaints are directed against all financing companies and all automobile manufacturers, except the Studebaker Corp. and its financing company. The Studebaker stipulation provided for discontinuance of advertising that might lead to the belief that the financing plan contemplates the payment of a simple interest rate. While a similar policy has been adopted by automobile producers and financing companies, formal stipulation with the Federal Trade Commission has not been accepted but likely will be soon.

Parts and Equipment Indexes Above Last Year's Figures

Due to recent sitdown strikes in the automobile and parts industries, production and employment indexes for the four-week period ending Feb. 6 were under the figures for the previous four-week period, but were ahead of the similar period last year, according to figures just compiled by Automotive Parts and Equipment Manufacturers, Inc.

The index on productive employment dropped from 135.4 in January to 120.6 in February, but February of this year was 12.5 per cent above last year. Productive manhours worked were 8.6 per cent under the January figures and 4.3 per cent greater than February of last year.

The average hourly rate of pay for the entire industry was 1.7 cents per hour higher in February than in January and 10 per cent more than in February of last year. Productive employees averaged 33.8 hours per week per man and earned an average of \$27.19 per week.

An analysis just completed on 16 of the largest original equipment manufacturers, for the four-week period ending March 6 shows an average hourly rate of pay for all employees of 78.6 cents per hour with productive male employees earning 85.3 cents per hour, an average of \$32.95 per man per week.

Bowens Products Co. Building New Plant

The Bowens Products Co., makers of lubricating devices and metal stampings, is building a new plant at Fourth and Hill Streets, Ecorse, Mich., to which operations will be transferred about May 1 from the present factory on West Warren Avenue, Detroit. The company now employs 600 men and this number will be increased to 850 when the new plant goes into production.

The correct
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ACCURACY INSURED
...AT TOP SPEED

"Barber-Colman"
Hobbing Machine

● A PROLONGED HIGH-SPEED RUN! Any interruption ... any shutdown ... may perhaps mean an entire production schedule shot. Back a few years, you might have had cause to worry. But now, any machine can be equipped with the modern **BIJUR AUTOMATIC LUBRICATING SYSTEM**. Each bearing kept bathed in its correct oil film ... continuously ... automatically. With **BIJUR** installed, your mind is free. Lubrication troubles automatically dismissed!

BIJUR LUBRICATING CORP. . . LONG ISLAND CITY, N. Y.

BIJUR

AUTOMATICALLY *Correct* LUBRICATION

Automotive Metal Markets

(Continued from page 517)

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Aluminum—The market for both primary and secondary aluminum is firm with considerable activity noted, especially in piston metal.

Copper—Announcement by leading producers following the close of the market on Tuesday that they had advanced their price for electrolytic to 17 cents per lb. took the trade by surprise as there had been no unusual demand and foreign quotations were lower. Announcement of the advance followed a one-quarter cent reduction by a leading producer of casting copper.

Tin—With the London market celebrating Easter on Monday, trading here on that day was strictly nominal, the closing quotations being 65½ cents for spot Straits. When London reopened on Tuesday, prices went off there as well as at Singapore, bringing the price for spot Straits here down to 63½ to 64 cents. A slight advance in ocean freight rates overhangs the market.

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Automotive Industry's Labor Report Shows Fewer Accessions

An increase of 4.3 per cent in the accession rate and a decrease of 11.2 per cent in the lay-off rate featured the Bureau of Labor Statistics' survey of labor turnover in manufacturing establishments for January.

The quit rate increased from 1.05 per 100 employees in December to 1.27 for January. A slight decrease was shown in the discharge rate. The total

separation rate declined from 3.41 in December to 3.38 in January. Compared with January, 1936, increases are shown in the quit and discharge rates; the lay-off rate declined from 2.66 to 1.90 per 100 employees and the total separation rate decreased from 3.57 to 3.38. The accession rate increased from 3.65 in January, 1936, to 4.60 in January, 1937.

In automobile and body plants the accession rate declined from 9.82 in the preceding month to 3.63 in January. In the automotive parts industry the accession rate decreased from 9.15 to 5.90 during the same period. Higher total separation rates were shown in

both groups, compared with December.

Detailed figures for the automobile and body and the automobile parts industries follow:

Class of rates	Monthly Turn-Over Rates (per 100 Employees)		
	January, 1937	December, 1936	January, 1936
Automobiles and Bodies			
Quit	1.40	1.80	0.86
Discharge	0.30	0.30	0.25
Lay-off	5.20	2.07	4.80
Total separation	6.90	4.17	5.91
Accession	3.63	9.82	2.34
Automobile Parts			
Quit	1.91	2.18	1.07
Discharge	0.53	0.63	0.36
Lay-off	5.25	1.89	6.53
Total separation	7.69	4.70	7.96
Accession	5.90	9.15	3.61



METAL SPHERES WITH LAPPED SURFACES

Strom Steel Balls possess that extra measure of quality by means of which the ultimate in ball bearing performance is achieved.

This special lapping practice is exclusive with Strom.

Physical soundness — correct hardness — size accuracy and sphericity are guaranteed in all Strom Balls.

Other types of balls — STAINLESS STEEL — MONEL — BRASS & BRONZE — are also available in all standard sizes. Write for full details.

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FTC Accuses Texas Co.

Exclusive Dealing in Accessories Charged Against Oil Firm

The Texas Co., New York, distributor of petroleum products and automotive accessories, is charged in a complaint by the Federal Trade Commission with promoting a so-called exclusive dealing policy in the sale of accessories.

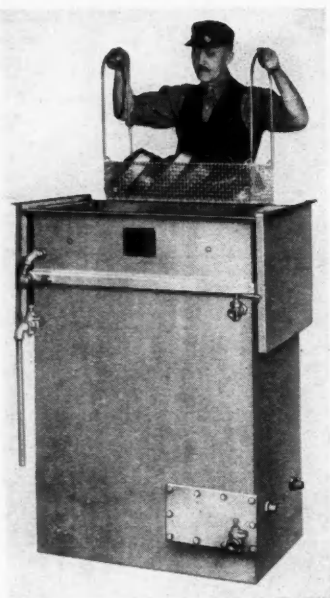
Violation of the exclusive dealing section of the Clayton Act is alleged through leasing and renewing leases of service stations at which Texas Co. products are sold, and through making

sales to and contracts with lessees, licensees and contracting dealers for sale of its merchandise, all on the condition and with the understanding that they shall not use or deal in the parts and accessories sold by certain of the respondent's competitors.

The company is alleged to have entered into contracts with B. F. Goodrich Co., Firestone Tire & Rubber Co., Champion Spark Plug Co., Westinghouse Lamp Co., Handy Governor Corp. of Detroit, and Anderson Co. of Gary, Ind., to purchase various accessories to be distributed for the most part through its lessees and contracting dealers, the respondent company

receiving a commission on sales. Accessories made by such companies are alleged to have been furnished to and forced upon its dealers by the Texas Co. on the condition and with the understanding that they should not deal in products competing with these manufacturers' makes of accessories for which the Texas Co. had contracted. In certain instances the respondent company allegedly threatened cancellation of service station contracts to compel operators to deal exclusively in products of the manufacturers named.

The complaint grants the respondent 20 days in which to file answer to the charges.



There are
**BLAKESLEE
DEGREASERS**
for your small
cleaning jobs
too!

Blakeslee for heavy productions—
Blakeslee for light productions—
From bench models to semi and fully
automatics—there is a Blakeslee for
every degreasing job.

Oily stampings, screw machine products, machined castings, die castings cleaned in a jiffy. You will say, "Miraculous"—for there is no scrubbing and no soaking. Moreover, parts are rendered clean and dry without streaks, spots, stains or runs.

The Blakeslee degreasing process is the fastest, most thorough and yet the simplest cleaning method known. It is safe too. No danger of etching or staining the sensitive zinc and aluminum die castings. Polished and buffed parts easily and quickly cleaned.

Blacosolv the stabilized degreasing solvent, is non-flammable and non-explosive. It is easily distilled and reclaimed right in the degreaser. No need to ever throw it away. Of uniform grade and highest quality it is the popular degreasing solvent. Prices quoted upon request.

A free demonstration in your plant at your request.

Write for latest bulletin, "Solvent Degreasing Machines."



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381 4th Avenue
NEW YORK, N. Y.

MAIN OFFICE & WORKS
1870 S. 52nd Avenue
Cicero Station
CHICAGO, ILLINOIS

Borg-Warner Stock to Be Split Two-for-One

All officers of the Borg-Warner Corp. were renamed by the board of directors following the annual stockholders' meeting. The stockholders in their annual meeting reelected all directors who served the past year.

The stockholders voted to increase the authorized common stock from 1,500,000 shares to 3,000,000 shares, reducing the par value of the stock from \$10 to \$5 per share. The stockholders also amended the articles of incorporation by canceling all of the authorized preferred stock of the corporation. The authorized capital stock is now all one class and kind, namely: 3,000,000 shares of common stock with a par value of \$5 each.

The stockholders also authorized the exchange of the present common stock for the new authorized common stock on a basis of two shares of \$5 par value for one share of the present common stock. There is at present issued and outstanding 1,230,906 shares of common stock, and by this exchange there will be issued and outstanding 2,461,812 shares of the newly authorized \$5 par value stock, leaving a remainder of unissued common stock of 538,188 shares.

The stockholders also voted to approve the amendment of the articles of incorporation to permit the corporation to carry on and conduct any and every kind of manufacturing business.

Advanced Welding Course Offered in Pittsburgh

Engineers, designers, welding supervisors, foremen and operators, and other individuals from industrial concerns of Pittsburgh and environs interested in welding, will have an opportunity of obtaining advanced instruction in the practical and theoretical aspects of arc welding the week of April 19, when a special course in arc welding design and practice, sponsored by the Lincoln Electric Co., Cleveland, Ohio, will be given. Meetings will be held at the Clifford B. Connelly Trade School Auditorium, 1500 Bedford Avenue, Pittsburgh. The course will be under the direction of E. W. P. Smith, welding authority of Cleveland, Ohio.